PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

To:

United States Patent and Trademark Office
(Box PCT)
Crystal Plaza 2
Washington, DC 20231
ÉTATS-UNIS D'AMÉRIQUE

in its capacity as elected Office

Date of mailing (day/month/year) 12 October 1998 (12.10.98)	
International application No. PCT/NL98/00102	**Applicant's or agent's file reference** 155867
International filing date (day/month/year) 20 February 1998 (20.02.98)	**Priority date** (day/month/year) 24 February 1997 (24.02.97)
Applicant DEGENKAMP, Gijsbertus	

1. The designated Office is hereby notified of its election made:

[X] in the demand filed with the International Preliminary Examining Authority on:

21 September 1998 (21.09.98)

[ ] in a notice effecting later election filed with the International Bureau on:

2. The election [X] was

[ ] was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO
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Authorized officer

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09/367761

PCT

REQUEST

The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty.

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International Application No. PCT/NL 98/00102

International Filing Date 20 FEB 1998 (20.02.98)

BUREAU VOOR DE INDUSTRIËLE EIGENDOM
P.C.T. INTERNATIONAL APPLICATION

Name of receiving Office and "PCT International Application"

Applicant's or agent's file reference *(if desired) (12 characters maximum)* 155867

Box No. I TITLE OF INVENTION

Anker en ontkoppelwerkwijze daarvoor.

Box No. II APPLICANT

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (i.e. country) of residence if no State of residence is indicated below.)*

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This person is applicant for the purposes of: ☐ all designated States ☒ all designated States except the United States of America ☐ the United States of America only ☐ the States indicated in the Supplemental Box

Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (i.e. country) of residence if no State of residence is indicated below.)*

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☒ applicant and inventor

☐ inventor only *(If this check-box is marked, do not fill in below.)*

State *(i.e. country)* of nationality: The Netherlands (NL)

State *(i.e. country)* of residence: The Netherlands (NL)

This person is applicant for the purposes of: ☐ all designated States ☐ all designated States except the United States of America ☒ the United States of America only ☐ the States indicated in the Supplemental Box

☐ Further applicants and/or (further) inventors are indicated on a continuation sheet.

Box No. IV AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE

The person identified below is hereby/has been appointed to act on behalf of the applicant(s) before the competent International Authorities as: ☒ agent ☐ common representative

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)*

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Box No.V DESIGNATION OF STATES

The following designations are hereby made under Rule 4.9(a) *(mark the applicable check-boxes; at least one must be marked)*:

Regional Patent

- ☒ **AP** **ARIPO Patent:** **GH** Ghana, **GM** Gambia, **KE** Kenya, **LS** Lesotho, **MW** Malawi, **SD** Sudan, **SZ** Swaziland, **UG** Uganda, **ZW** Zimbabwe, and any other State which is a Contracting State of the Harare Protocol and of the PCT
- ☒ **EA** **Eurasian Patent:** **AM** Armenia, **AZ** Azerbaijan, **BY** Belarus, **KG** Kyrgyzstan, **KZ** Kazakhstan, **MD** Republic of Moldova, **RU** Russian Federation, **TJ** Tajikistan, **TM** Turkmenistan, and any other State which is a Contracting State of the Eurasian Patent Convention and of the PCT
- ☒ **EP** **European Patent:** **AT** Austria, **BE** Belgium, **CH and LI** Switzerland and Liechtenstein, **DE** Germany, **DK** Denmark, **ES** Spain, **FI** Finland, **FR** France, **GB** United Kingdom, **GR** Greece, **IE** Ireland, **IT** Italy, **LU** Luxembourg, **MC** Monaco, **NL** Netherlands, **PT** Portugal, **SE** Sweden, and any other State which is a Contracting State of the European Patent Convention and of the PCT
- ☒ **OA** **OAPI Patent:** **BF** Burkina Faso, **BJ** Benin, **CF** Central African Republic, **CG** Congo, **CI** Côte d'Ivoire, **CM** Cameroon, **GA** Gabon, **GN** Guinea, **ML** Mali, **MR** Mauritania, **NE** Niger, **SN** Senegal, **TD** Chad, **TG** Togo, and any other State which is a member State of OAPI and a Contracting State of the PCT *(if other kind of protection or treatment desired, specify on dotted line)* .....

National Patent *(if other kind of protection or treatment desired, specify on dotted line)*:

- ☒ **AL** Albania .....
- ☒ **AM** Armenia .....
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In addition to the designations made above, the applicant also makes under Rule 4.9(b) all designations which would be permitted under the PCT except the designation(s) of _____

The applicant declares that those additional designations are subject to confirmation and that any designation which is not confirmed before the expiration of 15 months from the priority date is to be regarded as withdrawn by the applicant at the expiration of that time limit. *(Confirmation of a designation consists of the filing of a notice specifying that designation and the payment of the designation and confirmation fees. Confirmation must reach the receiving Office within the 15-month time limit.)*

PCT/NL 98/00102

Box No. VI PRIORITY CLAIM Further priority claims are indicated in the Supplemental Box ☐

The priority of the following earlier application(s) is hereby claimed:

Country *(in which, or for which, the application was filed)*	Filing Date *(day/month/year)*	Application No.	Office of filing *(only for regional or international application)*
item (1) The Netherlands	(24.02.1997) February 24,1997	1005353	
item (2)			
item (3)			

Mark the following check-box if the certified copy of the earlier application is to be issued by the Office which for the purposes of the present international application is the receiving Office (a fee may be required):

☒ The receiving Office is hereby requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) identified above as item(s) : 1

Box No. VII INTERNATIONAL SEARCHING AUTHORITY

Choice of International Searching Authority (ISA) *(If two or more International Searching Authorities are competent to carry out the international search, indicate the Authority chosen; the two-letter code may be used):* ISA / EP

Earlier search *Fill in where a search (international, international-type or other) by the International Searching Authority has already been carried out or requested and the Authority is now requested to base the international search, to the extent possible, on the results of that earlier search. Identify such search or request either by reference to the relevant application (or the translation thereof) or by reference to the search request:*

Country (or regional Office):	Date *(day/month/year)*:	Number:
The Netherlands	(31.10.1997) October 31, 1997	SN 29130 NL

Box No. VIII CHECK LIST

This international application contains the following number of sheets:

1. request	:	3 sheets
2. description	:	15 sheets
3. claims	:	6 sheets
4. abstract	:	1 sheets
5. drawings	:	5 sheets
Total	:	30 sheets

This international application is accompanied by the item(s) marked below:

1. ☐ separate signed power of attorney
2. ☐ copy of general power of attorney
3. ☐ statement explaining lack of signature
4. ☐ priority document(s) *identified in Box No. VI as item(s):*
5. ☒ fee calculation sheet
6. ☐ separate indications concerning deposited microorganisms
7. ☐ nucleotide and/or amino acid sequence listing (diskette)
8. ☐ other *(specify)*:

Figure No. _____ of the drawings (if any) should accompany the abstract when it is published.

Box No. IX SIGNATURE OF APPLICANT OR AGENT

Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the request).

Seerden

SEERDEN, Adrianus Maria

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1. Date of actual receipt of the purported international application: 20 FEB 1998 (20.02.98)
3. Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application:
4. Date of timely receipt of the required corrections under PCT Article 11(2):
5. International Searching Authority specified by the applicant: ISA /
6. ☐ Transmittal of search copy delayed until search fee is paid

2. Drawings:
☒ received:
☐ not received:

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Date of receipt of the record copy by the International Bureau: 16 MARCH 1998 (16.03.98)

Nr. 155867

Anker en ontkoppelwerkwijze daarvoor.

De uitvinding heeft betrekking op een anker met een vloei en een schacht, welke schacht stijf kan zijn of opgebouwd kan zijn uit draden, en aan het boveneind verbonden is met een ankerlijn.

Dergelijke ankers worden gebruikt voor het vastleggen van drijvende voorwerpen ten opzichte van een waterbodem, zoals semi-submersibles die gebruikt worden in de exploratie en exploitatie van zeebodems.

Bij installatie worden de ankers neergelaten op de waterbodem en dan door het uitoefenen van een trekkracht op de ankerlijn die verbonden is met het boveneind van de schacht in de grond getrokken totdat het anker daarin voldoende ver gepenetreerd is voor het leveren van de vereiste houdkracht. De genoemde ankerlijn, tot dan toe gebruikt als installatielijn, kan eventueel gebruikt worden voor het verbinden van het voorwerp en het anker.

Voor bepaalde verankeringssystemen, zoals zogenaamde verticale verankeringssystemen, is het wenselijk dat de meer- of lastlijnen een kracht uitoefenen op de vloei die zoveel mogelijk loodrecht op de vloei staat en gericht is door het oppervlaktezwaartepunt van de vloei. Dit kan bereikt worden door het punt van aangrijping van de installatielijn op de schacht naar een verder naar achter gelegen plaats op de schacht te verplaatsen, of door het verdraaien van de schacht ten opzichte van de

vloei. Alternatief kan gebruik gemaakt worden van een extra lastlijn, die van te voren op de gewenste plaats bevestigd is aan het anker, bijvoorbeeld op de vloei, ter plaatse van het oppervlaktezwaartepunt daarvan. Voorbeelden van dergelijke oplossingen zijn beschreven in aanvraagsters internationale octrooiaanvragen PCT/NL92/00144 en PCT/NL93/00257, de inhoud waarvan hier als ingelast dient te worden beschouwd. Ook kan verwezen worden naar de internationale octrooiaanvragen PCT/GB92/02210 en PCT/GB96/01755, waaruit ankers bekend zijn waarvan de hoek tussen de schacht en de vloei gewijzigd kan worden. In een uitvoering geschiedt dit door de schacht uit twee delen te laten bestaan, waarbij een schuin naar voren staand deel verbonden is met de installatielijn en het andere, rechtopstaande deel verbonden is met een (verticale) lastlijn. Door aan de lastlijn te trekken breekt een pen waardoor een ontkoppelmechanisme voor de verbinding tussen het schuine schachtdeel en de vloei gelost wordt. In een andere uitvoering is er sprake van een schacht, die met behulp van een verwijderbare keg die tussen schacht en vloei geklemd is aanvankelijk in een schuine stand vastgezet is. Door aan een extra treklijntje te trekken breekt een bout waarna een stang die aan het ondereind voorzien is van de keg langs de schacht omhoog verschoven kan worden om de keg te lichten, waarna de schacht rechtop gedraaid kan worden. In weer een andere uitvoering wordt de hoek vergroot door het met behulp van de ankerlijn omtrekken van de schacht van de installatiestand naar een verticale stand, door het omtrekken van de schacht en het daarbij laten bezwijken van een verbinding tussen schacht en vloei.

Het kan ook gewenst zijn om na het in de grond trekken van een anker de installatielijn terug te winnen, eventueel met de schacht. Voor verbinding van (de rest van) het anker met het voorwerp is dan reeds een extra ankerlijn bevestigd aan de vloei of (wanneer deze verbonden blijft met de vloei) met de schacht. De verbinding

tussen de installatielijn en de schacht danwel de verbinding tussen de schacht en de vloei kan daartoe ingericht zijn om te bezwijken bij een bepaalde trekkracht. Alternatief kan de verbinding schacht-vloei op afstand, bijvoorbeeld met een extra treklijntje, bedienbaar zijn voor ontkoppeling. Voorbeelden van ankers die daartoe zijn ingericht zijn omschreven in de voornoemde internationale octrooiaanvrage PCT/NL92/00144.

Het kan voorts gewenst zijn om de hoek tussen schacht en vloei te wijzigen om het anker, althans de vloei, uit de grond te kunnen trekken om het (kostbare) anker opnieuw te kunnen gebruiken. Uit de internationale octrooiaanvrage PCT/NL92/00144 is een anker bekend waarvan de schacht op twee in langsrichting van de vloei op afstand gelegen plaatsen verbonden is met de vloei, waarbij een van de verbindingen van op afstand losmaakbaar is, bijvoorbeeld met een extra treklijntje of op akoestische wijze, en de andere, bij voorkeur voorste verbinding een scharnier is. Door de eerstgenoemde verbinding te lossen zal de vloei alleen nog maar ter plaatse van de scharnierverbinding verbonden zijn met de vloei, die bij het uittrekken van het anker zich kan richten in een oriëntatie van de geringste weerstand. In een uitvoering is de eerstgenoemde verbinding ook verstelbaar, waardoor de hoek tussen schacht en vloei vergroot kan worden teneinde het anker in te kunnen zetten in de voornoemde verticale verankeringssystemen.

Voor al deze omzettingen is het nodig om een onderdeel te laten bezwijken alvorens de betreffende verbinding ontkoppeld kan worden en/of zijn bijzondere hulpmiddelen, zoals bijvoorbeeld treklijnen, akoestische middelen en hydraulische middelen nodig. Hierdoor bestaat enerzijds het risico, dat de betreffende verbinding bij een onvoorzien overschrijden van de bezwijkgrens van het onderdeel (lang) voordat zulks gewenst lost en men het anker weer in moet halen om dat opnieuw te installeren of moet afzien van een toekomstige mogelijkheid van omzet-

ting. Zou men dit risico willen vermijden -zo dat al mogelijk is- dan zou men omzichtig moeten manoeuvreren met het anker.

Anderzijds maken de genoemde hulpmiddelen het anker kostbaar en vatbaar voor beschadiging en daardoor storingsgevoelig voor wat betreft de omzettingsfunctie.

Een doel van de uitvinding is om een anker te verschaffen waarin op eenvoudige en betrouwbare wijze, op het gewenste ogenblik, een van de genoemde typen omzettingen, van de installatiefase naar de gebruiksfase of van de gebruiksfase naar de inhaalfase, kan plaatsvinden. Voorts is een doel van de uitvinding hiervoor een werkwijze te verschaffen.

Hiertoe voorziet de uitvinding in een anker met een vloei met een langsas die zich van het achtereind van de vloei naar het vooreind daarvan uitstrekt en met verbindingsmiddelen voor verbinding van de vloei met het benedeneind van een ankerlijn, welke verbindingsmiddelen een ankerschacht omvatten, waarbij de verbindingsmiddelen tenminste een koppeling omvatten met twee samenwerkende koppeldelen, waarvan de eerste aan de vloeizijde van de koppeling gelegen is en direct of indirect verbonden is met de vloei om de beweging daarvan te volgen en de tweede aan de ankerlijnzijde van de koppeling gelegen is en direct of indirect verbonden is met de ankerlijn, waarbij het anker voorts omvat bedieningsmiddelen voor de koppeling die geactiveerd worden door verzwaaiing van de gespannen ankerlijn om de hoek daarvan ten opzichte van de langsas van de vloei te wijzigen en dan het eerste en het tweede koppeldeel onderling verplaatsen van een koppelstand naar een stand waarin het tweede koppeldeel loskomt danwel uit koppelaangrijping komt van het eerste koppeldeel, waarbij het tweede koppeldeel een middels de manipulatie van de ankerlijn losbare koppelhaak omvat.

In het anker volgens de uitvinding is de te ontkoppelen verbinding op eenvoudige wijze en alleen op wens te lossen door het verzwaaien van de ankerlijn, die

een installatielijn danwel een lastlijn kan zijn.

Bij voorkeur is de koppeling zodanig ingericht, dat bij een verder trekken aan diezelfde ankerlijn, dus in een vloeiende, voortgezette beweging, de beide koppeldelen geheel van elkaar verwijderd worden en de daarmee samenhangende onderdelen van het anker op afstand van elkaar gebracht worden.

Bij voorkeur zij de bedieningsmiddelen ingericht voor het laten verdraaien van het tweede koppeldeel van de koppelstand naar de loskomstand. Hierdoor kan de draaibeweging van de ankerlijn op efficiënte wijze benut worden voor het ontkoppelen, zonder dat ingewikkelde overbrengmechanismen nodig zijn.

In een verdere uitvoering hiervan omvat het eerste koppeldeel een pen waaromheen de koppelhaak grijpt, waarbij de bedieningsmiddelen ingericht zijn voor het laten verdraaien van de haak om een as, die parallel is aan en op afstand ligt van de pen. Een dergelijke ontkoppelbare verbinding is zeer eenvoudig in uitvoering en in werking en kan op verschillende plaatsen in het anker worden toegepast zonder ingewikkelde bijkomende voorzieningen daarvoor.

De bedieningsmiddelen omvatten dan bij voorkeur een eerste aanslagvlak dat althans zolang de haak en de pen met elkaar gekoppeld zijn plaatsvast is ten opzichte van de pen alsmede een tweede aanslagvlak op de haak dat een geheel daarmee vormt, waarbij het eerste aanslagvlak een begrenzing vormt voor de verplaatsing van het tweede aanslagvlak bij verdraaiing van de haak om de pen en daarmee een draaipunt vormt voor de haak.

Het tweede aanslagvlak ligt bij voorkeur ten hoogste 180 graden in omtreksrichting van de haak verwijderd van het uiteinde van de haak om het loskomen van de haak te vergemakkelijken.

Bij voorkeur is daarbij de pen voorzien van een afplatting aan de van de haakopening afgekeerde zijde van de pen, om het laatste stadium van het lossen te bevorde-

ren.

De koppeling volgens de uitvinding kan met voordeel toegepast worden om een hoekvergroting tussen twee gedeelten van het anker te bewerkstelligen. Hierbij omvatten de verbindingsmiddelen een tweede, zich parallel aan de door de koppeldelen gevormde koppeling uitstrekkende, blijvende, latent aanwezige verbinding tussen de door de beide koppeldelen met elkaar verbonden delen van het anker, die werkzaam wordt na het losmaken van de koppeling.

De genoemde verbinding kan een kabel of ketting zijn, of een stijf element, dat uitschuifbaar of uitklapbaar is.

In het laatste geval kan, in het geval van een haakvormig tweede koppeldeel, deze haak middels een tweede pen verdraaibaar doch blijvend bevestigd zijn aan een eind van een langwerpig, stijf tussendeel, dat aan het andere eind middels een derde pen verdraaibaar verbonden is met een deel van het anker dat een stijf geheel vormt met de pen, die tussen de tweede en de derde draaipen gelegen is in de koppelstand.

In een mogelijke verdere ontwikkeling hiervan omvat het tussendeel een langsgleuf die concentrisch ligt ten opzichte van de pen en waarin de tweede pen kan verschuiven tot aan aanslag daarvoor, waarna de aanslag met de tweede pen een draaipunt vormt voor de haak.

In een andere mogelijke verdere ontwikkeling is de tweede pen vast verbonden met het tussendeel en de haak bij het ontkoppelen om de tweede pen verdraait.

Verdere voordelige uitvoeringen van het anker en de werkwijze volgens de uitvinding zijn onderwerp van de conclusies en van de hiernavolgende beschrijving van een aantal in de bijgevoegde tekeningen weergegeven voorbeelden.

Getoond wordt in:

Figuren 1A-D een eerste voorbeelduitvoering van een anker volgens de uitvinding, in opeenvolgende stadia;

figuren 2A-G een voorbeelduitvoering van een koppeling van het anker volgens de uitvinding, in opeenvolgende stadia en in doorsnede, alsmede in een alternatieve uitvoering;

figuren 3A-D een schachthoekverstelmechanisme dat gelegen is aan het boveneind van een schacht, tijdens opeenvolgende stadia;

figuren 4A, 4B en 4C een alternatief hoekverstellingsmechanisme waarin een koppeling volgens de uitvinding is opgenomen;

figuren 5A-D een andere voorbeelduitvoering van een anker volgens de uitvinding, waarbij de koppeling gebruikt wordt om het anker gemakkelijk in te kunnen halen;

figuur 6 een detail van een mogelijke uitvoering van de koppeling in een anker volgens de uitvinding;

figuren 7A-C een van meerdere koppelingen voorzien anker volgens de uitvinding; en

figuur 8 een ander voorbeeld van het anker volgens de uitvinding.

In de figuren 1A-D omvat het anker 1 een vloei 8, waarop vaste ophangpunten of steunen 9 en 10 bevestigd zijn, die elk bestaan uit twee opstaande platen waartussen respectievelijke pennen 11 en 12 bevestigd zijn. Begrepen zal worden dat er twee of meer steunen 9 en twee of meer steunen 10 aanwezig zijn. Elk van deze steunen vormt de bevestigingspunt voor de ondereinden of sokken van schachtdraden 3 en 4, die bovenaan samenkomen ter plaatse van sluiting 5, waaraan het ondereind van een ankerlijn 2 bevestigd is. Aan de ondereinden van de schachtdraden 3 en 4 zijn haakvormige bevestigingen 6 en 7 aangebracht, waarvan de haken precies passen bij de voornoemde pennen 11 en 12. In de in figuur 1A weergegeven toestand zijn de haken 6 en 7 opgesloten op de pennen 11 en 12, door gerichte vormgeving van de haken en de steunen. Hierop zal nog nader worden ingegaan bij de bespreking van de figuren 2A-E.

In figuur 1A is de stand weergegeven aan het eind van het laten penetreren van het anker 1. Het is vaak gewenst om de voor het installeren gebruikte ankerlijn 2 opnieuw te kunnen gebruiken. Deze ankerlijn is namelijk niet altijd geschikt voor gebruik tijdens het feitelijke verankeren of is daarvoor te duur. Het is dan voordelig indien de vloei 8 met een andere ankerlijn, de lastlijn of meerlijn, bevestigd wordt met het te verankeren voorwerp, bijvoorbeeld in een verticaal verankeringssysteem zoals dat besproken wordt in de in de inleiding genoemde Internationale octrooiaanvragen. In deze figuren is een bevestiging voor een dergelijke lastlijn niet weergegeven, maar begrepen zal worden dat deze dan aanwezig zal zijn.

Hier gaat het om het op een gemakkelijke wijze terugwinnen van de installatielijn 2, met de schachtdraden 3, 4 daar nog bij. Daartoe wordt behulp van het vaartuig waarmee de installatielijn 2 verbonden is, op de tekening gezien naar links gevaren, waardoor de lijn 2, onder straktrekken in de richting B, omzwaait in de richting A. Hierdoor zullen de schachtdraden 4 slap gaan staan en blijven de schachtdraden 3 strak staan. De voorste haken 6 zullen draaien in de richting C. Op een bepaald moment (zie figuren 2A-E) zal de haak 6 van de pen 11 afgedwongen zijn en loskomen, waarna, bij voortdurende trek in de richting B en voortdurend omzwaaien in de richting A de schachtdraden 4 strak zullen gaan staan. Bij voortgaande verzwaaiing in de richting A volgt nu voor de haken 7 ten opzichte van de pen 12 dezelfde procedure, totdat de situatie in figuur 1D weergegeven bereikt is en de beide schachtdraden 3 en 4 los zijn van de vloei 8.

In de figuren 2A-E is te zien hoe de haken 6 losraken. De hier weergegeven haak 6 is in figuur 1A nog vastgekoppeld aan de steun 9 met de pen 11. Zoals in de doorsnede van figuur 2F te zien is, is de steun 9 gevormd als een opstaande plaat met een gat 16, waarin de pen 11 gestoken is. Op de haak 6 zijn aan weerszijden platen 6a, 6b gelast, die ervoor zorgen dat de pen 11 niet los kan

komen. De platen 6a en 6b zorgen bovendien voor een versterking van de haak 6, zodat de trekkrachten zonder vervorming van de haak overgedragen kunnen worden tijdens installatie.

Beneden de pen 11 bevindt zich een bodem 14 (figuur 2A), die cirkelvormig is en een in het gedeelte 14a een kromming heeft die gelijk is aan een die concentrisch is ten opzichte van de hartlijn van de pen 11, het opsluitgedeelte, en een gedeelte 14b dat daarvan naar buiten wijkt. Aan het rechter eind gaat het gedeelte 14b over in een horizontaal vlak 15, dat daarvan wegloopt. De pen 11 is voorts voorzien van een afschuining 13 aan de loszijde voor de haak. De plaat 9 is aan het boveneind voorzien van een nok 17, die in eenzelfde verticaal vlak ligt als de aan de binnenin de haak 6 aangevormde nok 19 (niet weergegeven in figuur 2F). Bij verdraaiing in de richting C van de haak 6 zullen de nokken 17 en 19 zoals in figuur 2B te zien is, tegen elkaar aankomen om bij verdere verdraaiing (figuur 2C) in C' een draaipunt 20 voor de haak te vormen, dat op afstand ligt van de hartlijn van de pen 11. Het uiteinde 18 van de haak 6, dat op 180° ligt van het draaipunt 20 (beschouwd om pen 11) zal dan los willen komen van de pen 11, hetgeen mogelijk gemaakt wordt door de ruimte kromming van het vlak 14b. Bij verder verdraaien volgens C' krijgt het haakvormige uiteinde 18 als gevolg van het teruggelegen vlak 15 meer ruimte en uiteindelijk treedt de situatie weergeven in figuur 2E op, waarin het uiteinde van de haak als gevolg van de afschuining 13 langs de pen 11 omhoog weg kan bewegen van de steun 9. Begrepen zal worden dat een vergelijkbare inrichting toegepast kan worden bij de achterste steun 10 op de vloei 8, voor de haak 7, die dan in de richtign D verdraaid zal worden.

In figuur 2G is eem eenvoudig alternatief voor de koppeling van de figuren 2A-G getoond. Het opsluitgedeelte 14a is hierbij vervangen door een aan de plaat 9 gelaste opsluitnok 14c. Het eind 18 kan langs de nok 14c

naar buiten verdraaien wanneer het draaipunt 20 gerealiseerd is.

In de figuren 3A-D is een zogenaamde schachthoekversteller 31 weergegeven, zoals bijvoorbeeld omschreven is in aanvraagster's Internationale octrooiaanvrage PCT/NL93/00257. De ankerlijn 32 is met behulp van sok 40 ter plaatse van scharnierpen 41 blijvend bevestigd aan één eind van een langwerpige plaat 35, aan het andere eind waarvan een sluiting 37 voor achterste schachtdraden 34 middels scharnierpen 38 bevestigd is. Er kan hierbij sprake zijn van twee platen 35, die naast elkaar liggen en tussen zich een opneemruimte bepalen voor een tweede plaat 36, die met de plaat 35 scharnierbaar verbonden is ter plaatse van de scharnierpen 38 en voorzien is van een tot aan het binnenoppervlak van de plaat 35 reikende vaste pen 39. De plaat 36 is voorts ter plaatse van scharnierpen 43 verbonden met sluiting 42 voor voorste schachtdraden 33.

Bijzonder is nu dat het eindblok 40 aan het ondereind voorzien is van een haak 44, die tijdens het installeren van het anker, waartoe de schachtdraden 33, 34 behoren, als gevolg van de trekrichting de pen 39 omgrijpt. Hierdoor worden de platen 35 en 36 bij elkaar gehouden in een ingeklapte toestand. De haak 44 vorm hier met de pen 39 een grendelmechanisme dat ontkoppeld kan worden.

Wordt nu de aangehaalde ankerlijn 32 omgezwaaid in de richting E, dan zal spanning blijven bestaan in de voorste schachtdraden 33 en deze zullen meezwaaien naar een meer opstaande stand. De platen 35 en 36 zullen eveneens meeverdraaien, in een richting tegen de klokwijzers in. Door de verslapping van de schachtdraden 34 kan de ankerlijn 32 in (trek)lijn (F) komen te liggen met de voorste schachtdraden 33. De plaats van de pen 39 is nu zodanig ten opzichte van die treklijn, dat de haak 44 vrij is gekomen van de pen 39, die overigens weer voorzien kan zijn van een afschuining om het moment van lossen te vervroegen.

Vervolgens kan de plaat 36 in de richting G om de scharnierpen 38 kantelen naar de in de figuur 3D weergegeven toestand, waarin de afstand tussen de draaipen 41 en de sluiting 42 vergroot is en bijgevolg de schacht gevormd door schachtdraden 33 en 34 onder grotere openingshoek ten opzichte van de vloei zal kunnen staan dan in de situatie in figuur 3A het geval was.

In de figuren 4A en 4B is het anker 51 voorzien van een vloei 58 met voorste steunen 59 en achterste steunen 60, die respectievelijk voorzien zijn van pennen 61 en 62, een en ander in overeenstemming met het anker van de figuren 1A-D. De ankerlijn 52 is via sluiting 55 verbonden met voorste respectievelijk achterste schachtdraden 53 en 54, waarbij de achterste schachtdraden 54 middels een eindblok of sok 57 vast maar scharnierbaar verbonden zijn, via pen 62 met steun 60 op vloei 58. De voorste schachtdraden 53 zijn echter voorzien van sokken met haken 56, die grotendeels overeen kunnen komen met de haak van de figuren 2A-E. Hetzelfde geldt voor de steun 59: deze kan overeenkomen met steun 9.

Bijzonder is nu dat de haak 56 binnen in de kanten voorzien is van pen 66, die verschuifbaar opgenomen is in gleuf 70 die vervaardigd is in een geknikte langwerpige plaat 65, die aan het andere eind ter plaatse van scharnier 68 verbonden is met steun 67 die vast is aan de vloei 58. In de in figuur 4A weergegeven toestand loopt de gleuf 70 volgens een kromming die concentrisch is met de hartlijn van de pen 61. De haak 56 is verder voorzien van twee aangesloten zijplaten 56a, b, net als de eerder besproken haak 6.

Wanneer de ankerlijn 52 aangetrokken wordt in de richting I en omgezwaaid wordt in de richting H zal de haak 56 mee verdraaien, waarbij de pen 66 naar links loopt in de gleuf 70. Wanneer de pen 66 de eindbegrenzing 69 van de gleuf 70 bereikt wordt aldaar een draaipunt gevormd, dat vergelijkbaar is met draaipunt 20 in de figuren 2C-E. Bij voortgaande verzwaaiing in de richting H komt de haak

56 los, maar doordat de pen 66 opgesloten blijft in de langwerpige plaat 65 en daardoor de haak verbonden blijft, zij het indirect via 68, met de vloei 58, zal het effect zijn dat de afstand langs de voorste schachtdraden 53 tussen de sluiting 55 en de vloei 58 vergroot wordt, waardoor de naar voren openende schachthoek vergroot wordt. In het in figuur 4B weergegeven geval kan het anker 51 gebruikt worden voor een verankeringssysteem waarbij loodrecht op de vloei getrokken wordt. In plaats van de stijve platen 65 kan ook een flexibele ketting of kabel gebruikt worden, die verbonden is met de haak en de vloei.

In de figuren 5A-D is weer een voorbeeld weergegeven van een anker 71, die voorzien is van een schachthoekversteller 80, 81 als van een losmaakbare koppeling volgens de uitvinding aan het ondereind van de voorste schachtdraden 73. De achterste schachtdraden 74 zijn blijvend doch scharnierbaar verbonden met de vloei van het anker. Door het in de richting J omzwaaien van de ankerlijn 72 en daarbij in de richting K, K' te trekken komt de haak 76 los van de pen 81 van de steun 79. Deze constructie is vergelijkbaar met die bij de figuren 1A-D en 2A-E of 2G.

In figuur 6 is een verbindingsinrichting 90 volgens de uitvinding weergegeven, die te vinden is aan het boveneind van een schacht, hier bestaande uit voorste en achterste schachtdraden 93 respectievelijk 94. De inrichting 90 omvat een of meer parallelle platen 113', waaraan meerdere sluitingen voor meerdere draden of ankerlijnen bevestigd zijn. De achterste schachtdraden 94 zijn via oog 95 en sluiting 97 ter plaatse van draaipen 99 verbonden met de inrichting 90, terwijl de voorste schachtdraden 93 via oog 96 en sluiting 98 met scharnierpen 100 daarmee verbonden zijn. Voorts is een (verticale) lastlijn 91 via sluiting 103 en draaipen 104 verbonden met de inrichting 90. Aan het andere eind is de installatielijn 92 via haak 101 en pen 102 verbonden met de inrichting 90. Het ondereind van de haak 101 wordt daarbij

tussen draaipen 102 en wig 112 opgesloten gehouden. Deze wig 112 is zelf opgesloten tussen sluiting 98 en haak 101 en ter plaatse van draaipen 111 verbonden met een bedieningsstang 110, die aan het andere eind ter plaatse van 109 draaibaar verbonden is met hefboom 107, die met behulp van draaipennen 108 verdraaibaar verbonden is met de inrichting 90. Het andere eind van de hefboom 107 is met draaipen 106 verbonden met uitsteeksel 105, dat als één geheel gevormd is met de sluiting 103.

Na het tot in de juiste positie intrekken van het anker met behulp van de installatielijn 92 zal men de installatielijn 92 weer willen terugwinnen en de lastlijn 91 aan willen spannen. Wanneer de lastlijn 91, die ook als een ankerlijn beschouwd dient te worden, in de richting L omgezwaaid wordt zal de draaipen 106 in de richting M meedraaien en de draaipen 109 in de richting N tegendraaien. Als gevolg hiervan zal de staaf 110 verschuiven in de richting O, waardoor de wig 112 uit de ruimte tussen de sluiting 98 en de haak 101 getrokken zal worden, daarbij neerwaartse ruimte verschaffend voor de haak 101. De haak 101 kan nu loskomen van de pen 102, bijvoorbeeld door neerwaarts te vallen of door verder trekken aan de lijn 91. Het verwijderen kan ook bevorderd worden door het in de richting P omzwaaien van de installatielijn 92. De installatielijn 92 kan daarna ingehaald worden en de lastlijn 91 verder gespannen worden, waarbij tevens het gevolg is dat de positie van de draaipennen 99 en 100 gewijzigd zal worden en de schachthoek vergroot wordt.

In de figuren 7A-C is het principe volgens de uitvinding meervoudig toegepast. Het anker 200, van het zogenaamde Stevpris-type, welk type verkrijgbaar is bij aanvraagster, heeft een vloei 204 en een stijve schacht 213 die bestaat uit twee gelijke platen, waarbij - zoals schematisch is weergegeven - op beide platen, op halve hoogte, een pen 206 aangebracht is en waarbij aan het boveneind de platen met elkaar verbonden zijn middels pen 205. Om de pen 205 grijpt een haak 211, die bevestigd is

aan de ankerlijn 202, die wordt gebruikt tijdens installatie. Ter plaatse van 208 is het boveneind van de haak 211 echter nog verbonden met twee verlengstukken 203a, 203b van de ankerlijn 202, welk verlengstukken 203 elk ter plaatse van 209 verbonden zijn met een vergelijkbare haak 212. Deze haken 212 grijpen op de hiervoor beschreven wijze om de respectieve draaipennen 206 en zijn daarbij in zijwaartse richting opgesloten. De haken 212 zijn ieder ter plaatse van 209 weer verbonden met een verdere verlengstukken 204a, b van de ankerlijn. Deze verlengstukken 204a, b zijn tenslotte ter plaatse van de 210 bevestigd aan het boveneind van de schacht 213.

Wanneer het gewenst is om na installatie het anker te gebruiken in verankeringssystemen, waarin in hoofdzaak loodrecht op het bovenoppervlak van de vloei getrokken moet worden, wordt de installatielijn 202 omgelegd in de richting Q onder het uitoefenen van trekkrachten in de richting R. Op de hiervoor beschreven wijze zal de haak 211, vanwege het feit dat het anker 200 door de grond in positie wordt gehouden, verdraaien om de pen 205 en loskomen. Dan is de situatie weergegeven in figuur 7B bereikt, waarin de ankerlijn 202, 203a, b met behulp van haak 212 en pen 206 verbonden is met het anker 200. Die situatie is de gebruikssituatie, waarin de ankerlijn 202 nagenoeg samenvalt met de lijn X die loodrecht staat op het oppervlak van de vloei 214 en door het oppervlaktezwaartepunt daarvan heen gaat.

Wanneer het gewenst is om het anker 200 weer in te halen, verzwaait men de ankerlijn 202 weer verder in de richting Q om op de eerder besproken wijze de haken 212 te laten lossen van de pennen 206. Dan verplaatst het aangrijpingspunt van de ankerlijn 202, 203a, b, 204a, b naar punt 210 bovenaan de schacht, en kan het anker 200 met een voldoende schuine stand van de ankerlijn uit de bodem getrokken worden.

Begrepen zal worden dat het koppelmechanisme volgens de uitvinding alsmede de bedieningsmiddelen daar-

voor velerlei vormen kunnen hebben. Zo kan, zoals weergegeven in figuur 8, in een anker 301 met een vloei 318 en een stijve schacht 303 een hefboommechanisme voorzien worden, dat zich langs de schacht naar een achterste bevestigingspunt 311 van de schacht op de vloei uitstrekt. Het hefboommechanisme werlt aldus dat verdraaiing in richting S van de strakke ankerlijn 302 de sluiting 305 verdraait om draaipen 306, waarbij de met sluiting 305 draaivaste hefbomen 307 mee verdraaien. De arm 307 is met pen 308 scharnierbaar verbonden met stang 309, die verschuift in de richting T. Ter plaatse van de bevestiging 311 bevindt zich een niet nader weergegeven koppeling waarmee het tweede koppeldeel ten opzichte van het met de vloei vaste eerste koppeldeel verplaatst wordt om deze te ontkoppelen en de bevestiging 311 te lossen. De schacht 303 blijft dan met de voorste scharnierverbinding 310 verbonden met de vloei 308.

In veel gevallen zal de meest voordelige aanpak zijn om de ankerlijn bij het ontkoppelen te verzwaaien in een de hoek met de vloei vergrotende richting. Begrepen zal worden dat het echter ook mogelijk zal zijn om de koppeling zodanig in te richten, dat verzwaaiing in de tegengestelde richting nodig is.

C O N C L U S I E S

1. Anker met een vloei met een langsas die zich van het achtereind van de vloei naar het vooreind daarvan uitstrekt en met verbindingsmiddelen voor verbinding van de vloei met het benedeneind van een ankerlijn, welke verbindingsmiddelen een ankerschacht omvatten, waarbij de verbindingsmiddelen tenminste één koppeling omvatten met twee samenwerkende koppeldelen, waarvan de eerste aan de vloeizijde van de koppeling gelegen is en direct of indirect verbonden is met de vloei om de beweging daarvan te volgen en de tweede aan de ankerlijnzijde van de koppeling gelegen is en direct of indirect verbonden is met de ankerlijn, waarbij het anker voorts omvat bedieningsmiddelen voor de koppeling die geactiveerd worden door verzwaaiing van de strak gehouden ankerlijn om de hoek daarvan ten opzichte van de langsas van de vloei te wijzigen en dan het eerste en het tweede koppeldeel onderling verplaatsen van een koppelstand naar een stand waarin het tweede koppeldeel loskomt danwel uit koppelaangrijping komt van het eerste koppeldeel, waarbij het tweede koppeldeel een middels de manipulatie van de ankerlijn losbare koppelhaak omvat.

2. Anker volgens conclusie 1, waarbij de koppeling ingericht is opdat na het loskomen van de koppelhaak door het trekken aan de ankerlijn deze geheel weggelicht kan worden van het eerste koppeldeel.

3. Anker volgens conclusie 1 of 2, waarbij de bedieningsmiddelen voorzien zijn van middelen voor het - bij genoemde verplaatsing - van het eerste koppeldeel af dwingen van het tweede koppeldeel.

4. Anker volgens conclusie 1 of 2, waarbij de bedieningsmiddelen ingericht zijn voor het laten verdraai-

en van de koppelhaak van de koppelstand naar de loskomstand, waarbij het eerste koppeldeel bij voorkeur een pen omvat waaromheen de koppelhaak grijpt, waarbij de bedieningsmiddelen ingericht zijn voor het laten verdraaien van de haak om een as, die parallel is aan en op afstand ligt van de pen.

5. Anker volgens conclusie 4, waarbij de bedieningsmiddelen een eerste aanslagvlak omvatten dat althans zolang de koppelhaak en de pen met elkaar gekoppeld zijn plaatsvast is ten opzichte van de pen alsmede een tweede aanslagvlak op de haak dat een geheel daarmee vormt, waarbij het eerste aanslagvlak een begrenzing vormt voor de verplaatsing van het tweede aanslagvlak bij verdraaiing van de haak om de pen en daarmee een draaipunt vormt voor de haak.

6. Anker volgens conclusie 5, waarbij het tweede aanslagvlak ten hoogste 180 graden in omtreksrichting van de haak verwijderd ligt van het uiteinde van de koppelhaak.

7. Anker volgens conclusie 5 of 6, waarbij de pen voorzien is van een afplatting aan de van de haakopening afgekeerde zijde van de pen.

8. Anker volgens een der voorgaande conclusies, waarbij de verbindingsmiddelen een tweede, zich parallel aan de door de koppeldelen gevormde koppeling uitstrekkende, blijvende, latent aanwezige verbinding tussen de door de beide koppeldelen met elkaar verbonden delen van het anker omvat, die werkzaam wordt na het losmaken van de koppeling.

9. Anker volgens conclusie 8, waarbij de genoemde verbinding een kabel of ketting is.

10. Anker volgens conclusie 8, waarbij de genoemde verbinding een stijf element is dat uitschuifbaar of uitklapbaar is.

11. Anker volgens conclusie 4 en 10, waarbij de koppelhaak middels een tweede pen verdraaibaar doch blijvend bevestigd is aan een eind van een langwerpig, stijf

tussendeel, dat aan het andere eind middels een derde pen verdraaibaar verbonden is met een deel van het anker dat een stijf geheel vormt met de pen, die tussen de tweede en de derde draaipen gelegen is in de koppelstand.

12. Anker volgens conclusie 11, waarbij het tussendeel een langsgleuf omvat die concentrisch ligt ten opzichte van de pen en waarin de tweede pen kan verschuiven tot aan aanslag daarvoor, waarna de aanslag met de tweede pen een draaipunt vormt voor de koppelhaak.

13. Anker volgens conclusie 11, waarbij de tweede pen vast verbonden is met het tussendeel en de haak bij het ontkoppelen om de tweede pen verdraait.

14. Anker volgens een der voorgaande conclusies, waarbij het eerste koppeldeel bevestigd is op de vloei en het tweede koppeldeel bevestigd is aan het ondereind van de schacht.

15. Anker volgens conclusie 14, waarbij de schacht met tenminste twee in de richting van de langsas op afstand van elkaar gelegen scharnierverbindingen verbonden is met de vloei, waarbij althans de voorste scharnierverbinding uitgevoerd is als de voornoemde koppeling.

16. Anker volgens conclusie 15, waarbij ook de andere, achtergelegen scharnierverbinding uitgevoerd is als de voornoemde koppeling.

17. Anker volgens conclusie 16, waarbij het tweede koppeldeel van de voorste scharnierverbinding deel uitmaakt van de bedieningsmiddelen voor de achterste scharnierverbinding.

18. Anker volgens conclusie 14, waarbij de bedieningsmiddelen een hefboommechanisme omvatten dat verdraaibaar aangebracht is op het anker en in verbinding staat met een het eerste koppeldeel opsluitend gedeelte van het tweede koppeldeel om dat ten opzichte van het eerste koppeldeel te verplaatsen voor het vrijgeven daarvan.

19. Anker volgens conclusie 18, waarbij de schacht met tenminste twee in de richting van de langsas

op daar gelegen scharnierverbindingen verbonden zijn met de vloei, waarbij althans de achterste scharnierverbinding uitgevoerd is als de voornoemde koppeling.

20. Anker volgens conclusie 19, waarbij het hefboommechanisme zich van de achterste scharnierverbinding langs de schacht uitstrekt naar het boveneind daarvan en aldaar voor meegaande rotatie verbonden is met een sluiting voor een installatielijn.

21. Anker volgens een der conclusies 1-13, waarbij de koppeling gelegen is tussen de schacht en de ankerlijn.

22. Anker volgens conclusie 21, waarbij de schacht opgebouwd is uit langwerpige elementen die zich tussen de vloei en de ankerlijn uitstrekken, waarbij althans twee langwerpige elementen met hun ondereind verdraaibaar aan de vloei bevestigd zijn op in langsrichting op afstand van elkaar gelegen plaatsen en met hun boveneind op op afstand van elkaar gelegen plaatsen verdraaibaar aan een eerste, stijve langwerpige koppelplaat bevestigd zijn, waarbij een tweede, stijve langwerpige koppelplaat aan een eind scharnierbaar verbonden is met de eerste koppelplaat en op afstand daarvan met de eerste koppelplaat de koppeling vormt.

23. Anker volgens conclusie 22, waarbij de scharnierverbinding tussen de twee koppelplaten samenvalt met de verbinding tussen het achterste langwerpige element en de eerste koppelplaat.

24. Anker volgens conclusie 21, 22 of 23, waarbij de schacht bovenaan voorzien is van een verbinding voor een installatielijn en van een verbinding voor een meer- of lastlijn, waarbij de verbinding voor de installatielijn voorzien is van de koppeling en de bedieningsmiddelen voor de koppeling geactiveerd worden door het verdraaien van de lastlijn.

25. Anker volgens conclusie 24, waarbij de bedieningsmiddelen een hefboommechanisme omvatten, dat

verdraaibaar aangebracht is op de schacht en het eerste koppeldeel met een het tweede koppeldeel opsluitend gedeelte, zoals een wig, in verbinding staat met het hefboommechanisme om daardoor ten opzichte van het tweede koppeldeel verplaatst te worden voor het vrijgeven daarvan.

26. Anker volgens conclusie 21, waarbij de schacht stijf is en de koppeling aan het boveneind van de schacht voorzien is, waarbij de ankerlijn voorts middels een latent aanwezig verlengstuk verbonden is met de schacht op een plaats tussen de vloei en het boveneind van de schacht.

27. Anker volgens conclusie 26, waarbij de genoemde plaats althans nagenoeg loodrecht boven het oppervlaktezwaartepunt van de vloei gelegen is.

28. Anker volgens conclusie 26 of 27, waarbij het latent aanwezige verlengstuk middels een tweede koppeling verbonden is met de schacht op de genoemde plaats.

29. Anker volgens conclusie 28, waarbij de ankerlijn danwel het verlengstuk middels een tweede latent aanwezig verlengstuk verbonden is met het boveneind van de schacht.

30. Anker volgens een der voorgaande conclusies, waarbij de koppeling en de bedieningsmiddelen ingericht zijn voor ontkoppeling op niet-destructieve wijze.

31. Anker volgens een der voorgaande conclusies, waarbij de verdraaiing van de ankerlijn voor de ontkoppeling plaatsvindt bij vergroting van de voorwaarts openende hoek tussen ankerlijn en de langsas van de vloei.

32. Anker volgens een der voorgaande conclusies, waarbij in de koppeling een weerstand zoals een veer opgenomen is om onopzettelijk loskomen bij een ongestuurde verzwaaiing van de ankerlijn te voorkomen.

33. Anker waarin een of meerdere van de in de beschrijving omschreven en/of in de figuren afgebeelde kenmerkende maatregelen verwezenlijkt zijn.

34. Werkwijze voor het ontkoppelen van een

koppeling of vergrendeling in de verbinding tussen de vloei van een anker en een ankerlijn, waarbij de ankerlijn in aangespannen toestand omgezwaaid wordt en daardoor de ontkoppeling inleidt.

35. Werkwijze zoals in essentie omschreven in de beschrijving en/of afgebeeld in de figuren.

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Uittreksel

Anker met een vloei met een langsas die zich van het achtereind van de vloei naar het vooreind daarvan uitstrekt en met verbindingsmiddelen voor verbinding van de vloei met het benedeneind van een ankerlijn, welke verbindingsmiddelen een ankerschacht omvatten, waarbij de verbindingsmiddelen tenminste één koppeling omvatten met twee samenwerkende koppeldelen, waarvan de eerste aan de vloeizijde van de koppeling gelegen is en direct of indirect verbonden is met de vloei om de beweging daarvan te volgen en de tweede aan de ankerlijnzijde van de koppeling gelegen is en direct of indirect verbonden is met de ankerlijn, waarbij het anker voorts omvat bedieningsmiddelen voor de koppeling die geactiveerd worden door verzwaaiing van de strak gehouden ankerlijn om de hoek daarvan ten opzichte van de langsas van de vloei te wijzigen en dan het eerste en het tweede koppeldeel onderling verplaatsen van een koppelstand naar een stand waarin het tweede koppeldeel loskomt danwel uit koppelaangrijping komt van het eerste koppeldeel, waarbij het tweede koppeldeel een middels de manipulatie van de ankerlijn losbare koppelhaak omvat.

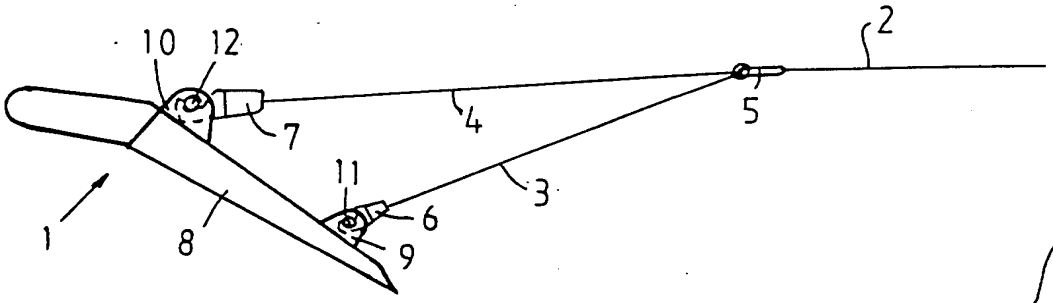


FIG.1A

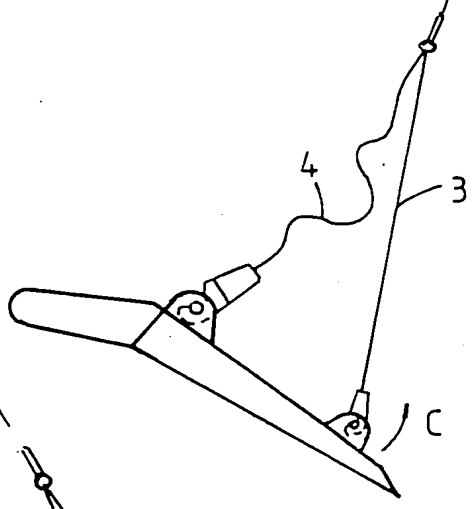


FIG.1B

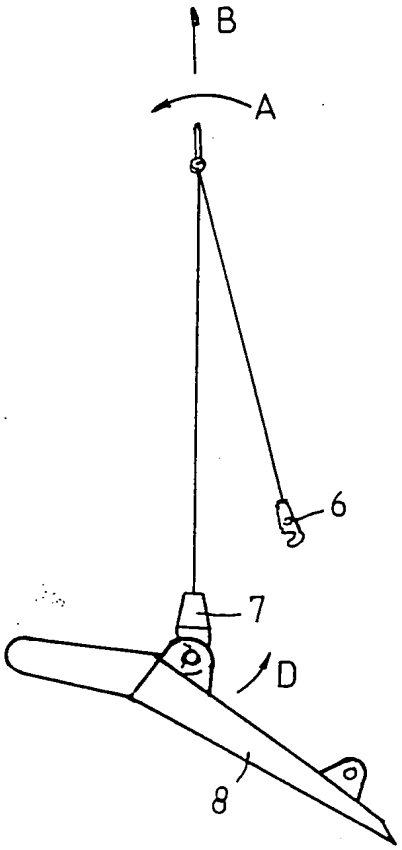
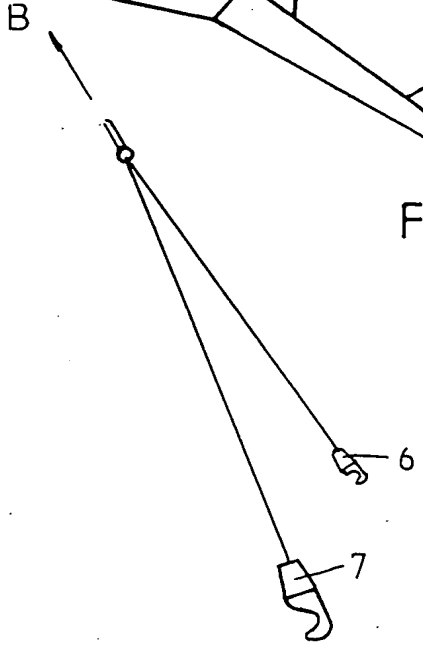


FIG.1C



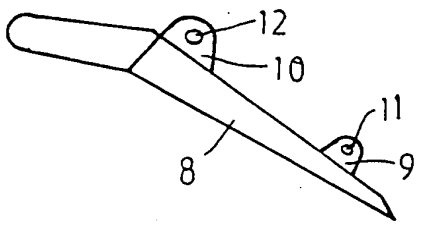


FIG.1D

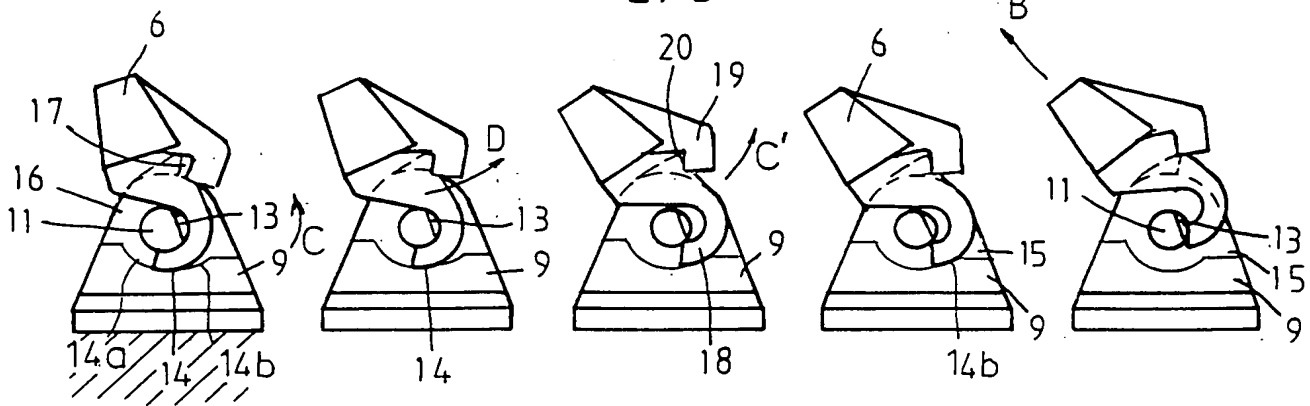


FIG. 2A FIG. 2B FIG. 2C FIG. 2D FIG. 2E

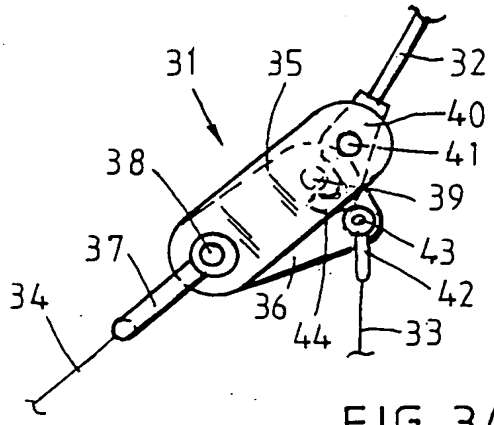


FIG. 3A

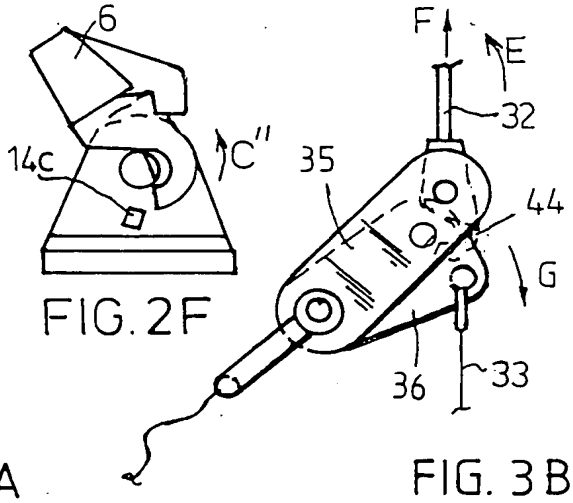


FIG. 2F FIG. 3B

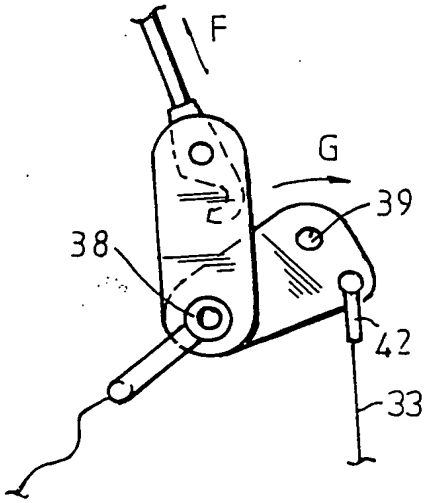


FIG. 3C

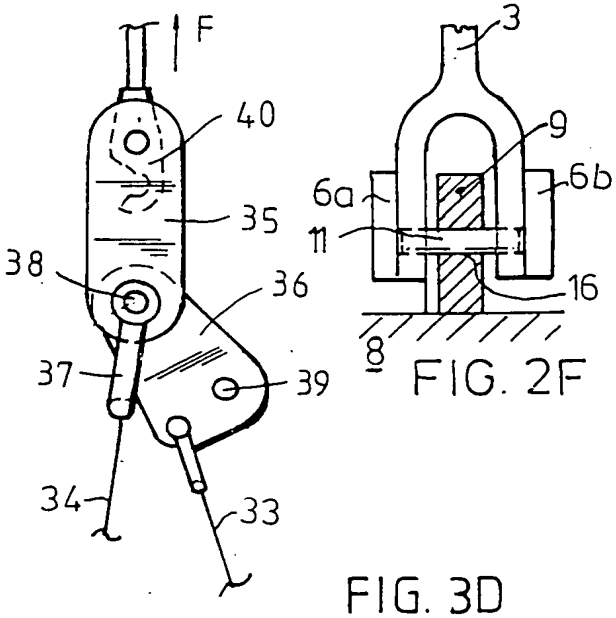


FIG. 2F FIG. 3D

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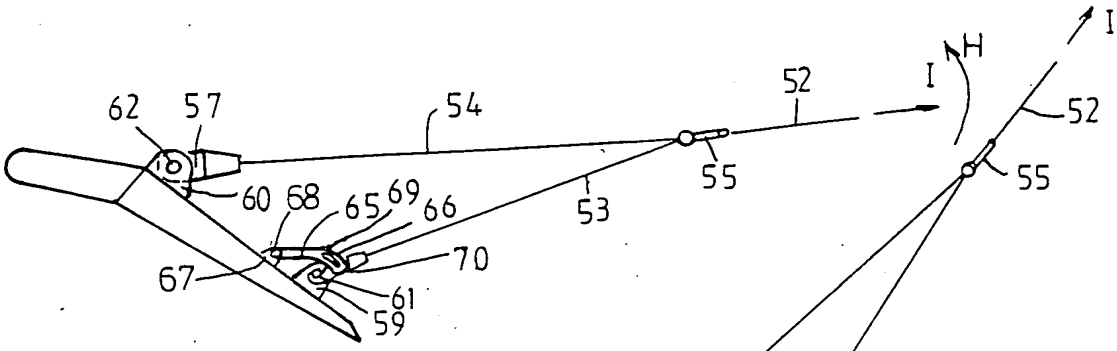

FIG. 4A

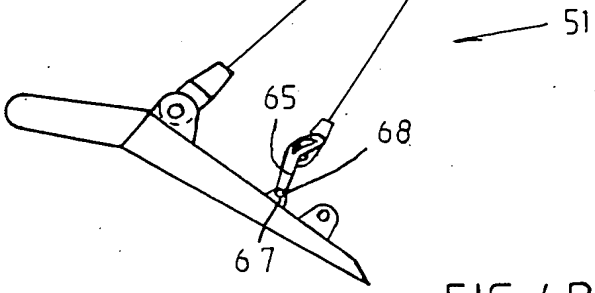

FIG. 4B

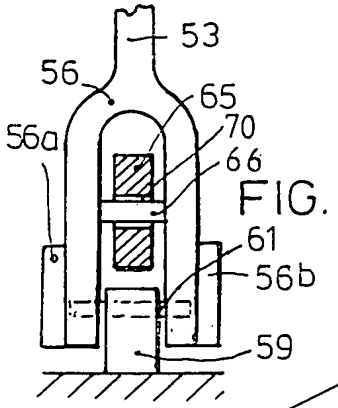

FIG. 4C

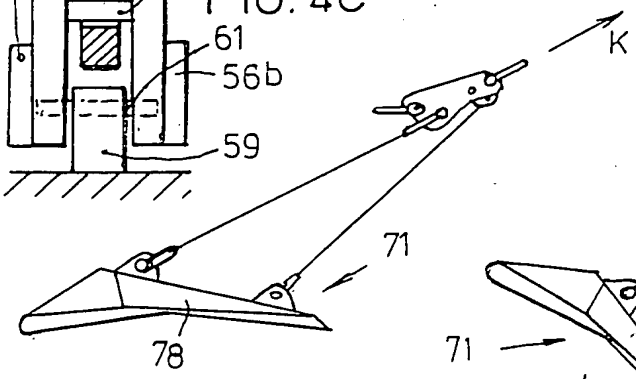

FIG. 5A

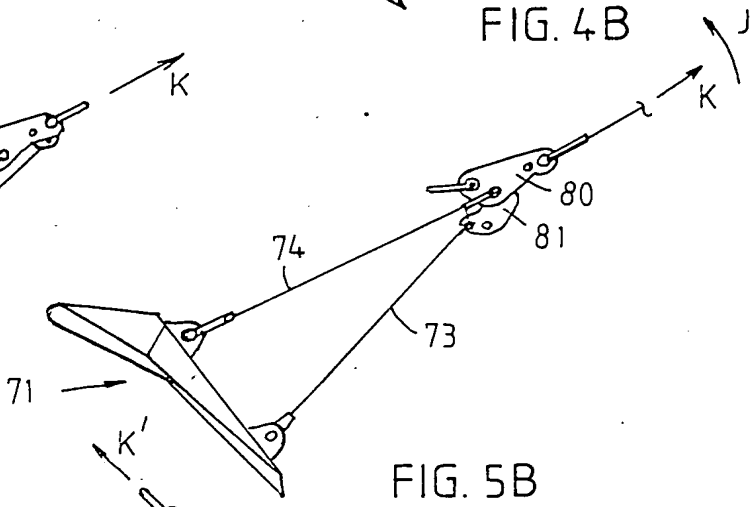

FIG. 5B

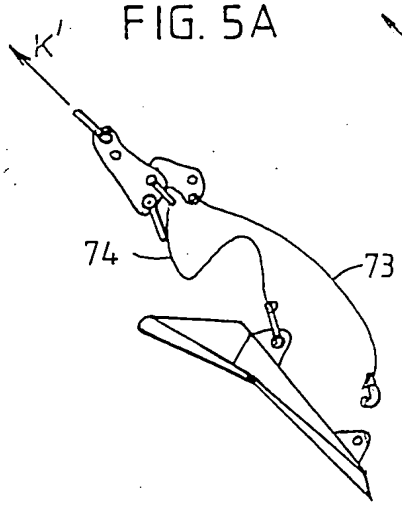

FIG. 5C

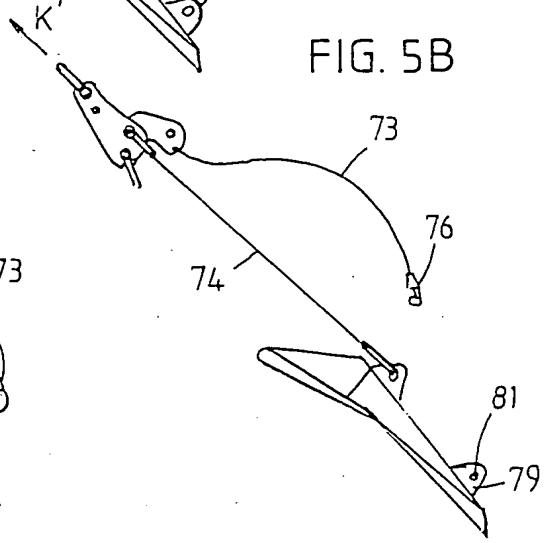

FIG. 5D

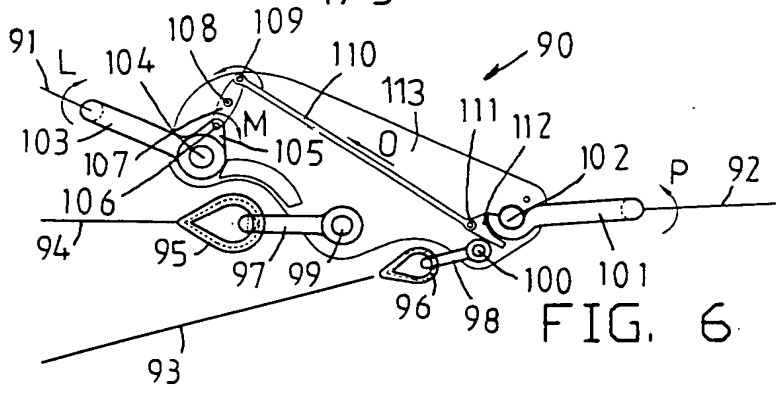

FIG. 6

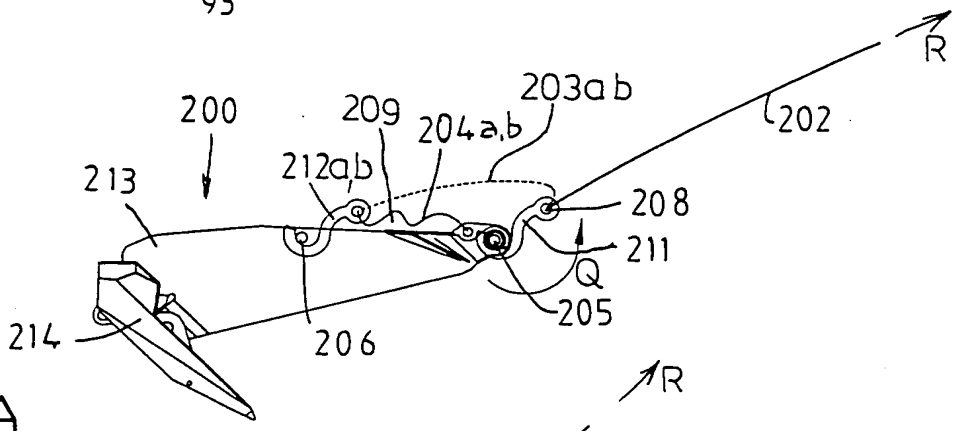

FIG. 7A

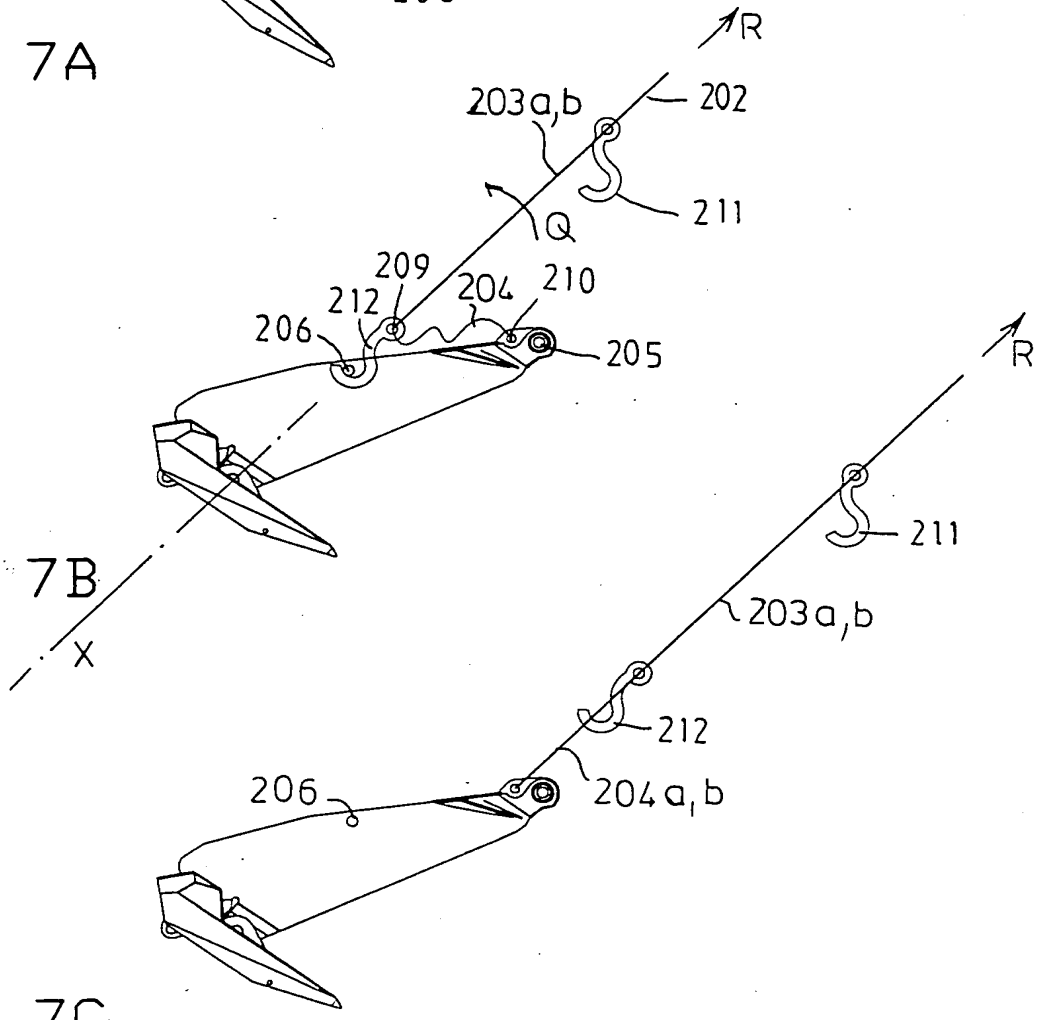

FIG. 7B

FIG. 7C

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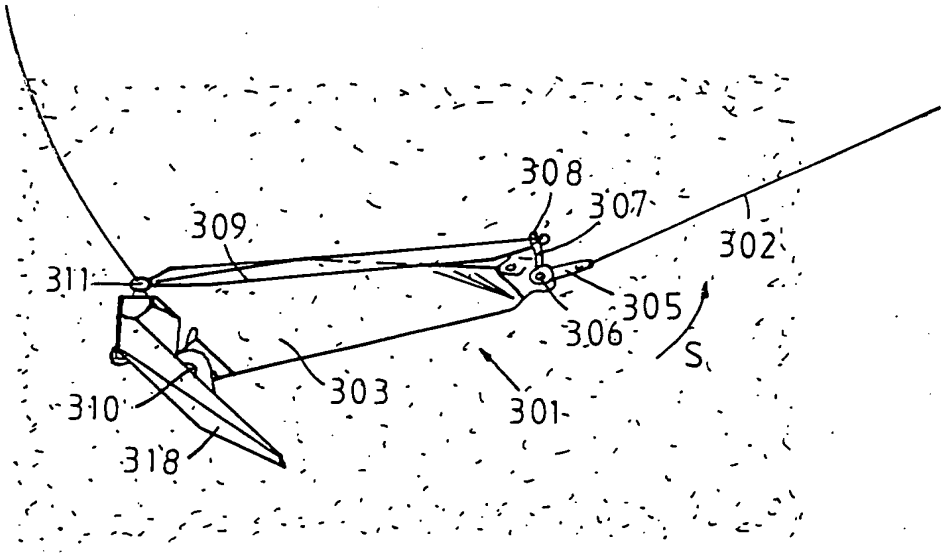

FIG. 8

PATENT COOPERATION TREATY

PCT

09/367761

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	**FOR FURTHER ACTION**	see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.
155867		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/NL 98/ 00102	20/02/1998	24/02/1997

Applicant

VRIJHOF ANKERS BEHEER B.V. et al.

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 04 sheets.

[X] It is also accompanied by a copy of each prior art document cited in this report.

1. [ ] **Certain claims were found unsearchable** (see Box I).

2. [ ] **Unity of invention is lacking** (see Box II).

3. [ ] The international application contains disclosure of a **nucleotide and/or amino acid sequence listing** and the international search was carried out on the basis of the sequence listing
   - [ ] filed with the international application.
   - [ ] furnished by the applicant separately from the international application,
     - [ ] but not accompanied by a statement to the effect that it did not include matter going beyond the disclosure in the international application as filed.
   - [ ] Transcribed by this Authority

4. With regard to the **title,**
   - [ ] the text is approved as submitted by the applicant
   - [X] the text has been established by this Authority to read as follows:

   ANCHOR AND METHOD OF UNCOUPLING FOR SUCH ANCHOR

5. With regard to the **abstract,**
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6. The figure of the **drawings** to be published with the abstract is:

   Figure No. 1A, 1B
   - [ ] as suggested by the applicant.
   - [X] because the applicant failed to suggest a figure.
   - [ ] because this figure better characterizes the invention.
   - [ ] None of the figures.

Box III TEXT OF THE ABSTRACT (Continuation of item 5 of the first sheet)

Anchor (1) with a fluke (8) with a longitudinal axis which extends from the rear end of the fluke (8) to its front end and with connection means for connecting the fluke with the lower end of an anchor line (2), which connecting means comprise an anchor shank (3,4), the connecting means comprising at least one coupling (6,7,9,10,11,12) with two cooperating coupling members (6,7,11,12), the first of which being situated on the fluke side (11,12) of the coupling and being directly or indirectly connected to the fluke in order to follow its movement and the second (6,7) being situated on the anchor line side of the coupling and being directly or indirectly connected to the anchor line (2), the anchor (1)furthermore comprising operation means (17,19) for the coupling which means are activated by swinging (A) the anchor line (2) held taut in order to change its angle with respect to the longitudinal axis of the fluke (8) and then to mutually displace the first (11,12) and second (6,7) coupling member from a coupling position to a position in which the second coupling member (6,7) is released or emerges from coupling engagement with the first coupling member (11,12), the second coupling member (6,7) comprising a coupling hook (6,7) which can be released by means of manipulation of the anchor line (2).

INTERNATIONAL SEARCH REPORT

[redacted]ational Application No
PCT/NL 98/00102

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 B63B21/46 B63B21/22 //E02D5/80

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 B63B E02D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	PATENT ABSTRACTS OF JAPAN vol. 15, no. 485 (M-1188), 9 December 1991 & JP 03 208791 A (K. HIKITANI), 11 September 1991, see abstract; figures 1-7	1,4,30, 31,33-35
A		14,15, 18,19

X	PATENT ABSTRACTS OF JAPAN vol. 9, no. 206 (M-406), 23 August 1985 & JP 60 067289 A (SOUJIROU NAKAMURA), 17 April 1985, see abstract; figures 1-5	33-35
A		1-4,8,9, 14,21, 26,30,31

	-/--	

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
16 June 1998	24/06/1998

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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X	US 3 450 088 A (W. GUIER) 17 June 1969 see figures 1-4	33-35
A		1,2,4, 14,15,30

X	FR 2 644 748 A (J. DUCLOUX) 28 September 1990 see the whole document	34
A		1,18,20, 25,30-32

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A		1,30,31

X	US 4 230 062 A (P.J. FORNASIERO) 28 October 1980 see the whole document	33-35
A		1,18,20, 25,30,31

A	WO 93 03958 A (VRIJHOF ANKERS BEHEER B.V.) 4 March 1993 cited in the application see figures 1-3,10,11 see figures 19-23D see page 17, line 18 - page 19, line 12 see page 21, line 33 - page 22, line 25	1,8,9, 14,19, 22,26, 27,30,34

A	EP 0 297 703 A (S. KOBAYASHI) 4 January 1989	

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/NL 98/00102

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
US 3450088	A	17-06-1969	NONE		
FR 2644748	A	28-09-1990	NONE		
US 2007667	A	09-07-1935	NONE		
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			CA	1306900 A	01-09-1992
			US	4836126 A	06-06-1989

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(51) International Patent Classification 6 :
B63B 21/46, 21/22 // E02D 5/80

A1

(11) International Publication Number: **WO 98/36963**

(43) International Publication Date: 27 August 1998 (27.08.98)

(21) International Application Number: PCT/NL98/00102

(22) International Filing Date: 20 February 1998 (20.02.98)

(30) Priority Data:
1005353 24 February 1997 (24.02.97) NL

(71) Applicant *(for all designated States except US)*: VRIJHOF ANKERS BEHEER B.V. [NL/NL]; Meerkoetstraat 83a, NL–2990 AC Krimpen a/d Ijssel (NL).

(72) Inventor; and
(75) Inventor/Applicant *(for US only)*: DEGENKAMP, Gijsbertus [NL/NL]; Oosteinde 21, NL–2271 EA Voorburg (NL).

(74) Agent: FERGUSON, Alexander; Octrooibureau Vriesendorp & Gaade, P.O. Box 266, NL–2501 AW The Hague (NL).

(81) Designated States: AL, AM, AT, AT (Utility model), AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, CZ (Utility model), DE, DE (Utility model), DK, DK (Utility model), EE, EE (Utility model), ES, FI, FI (Utility model), GB, GE, GH, GM, GW, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SK (Utility model), SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).

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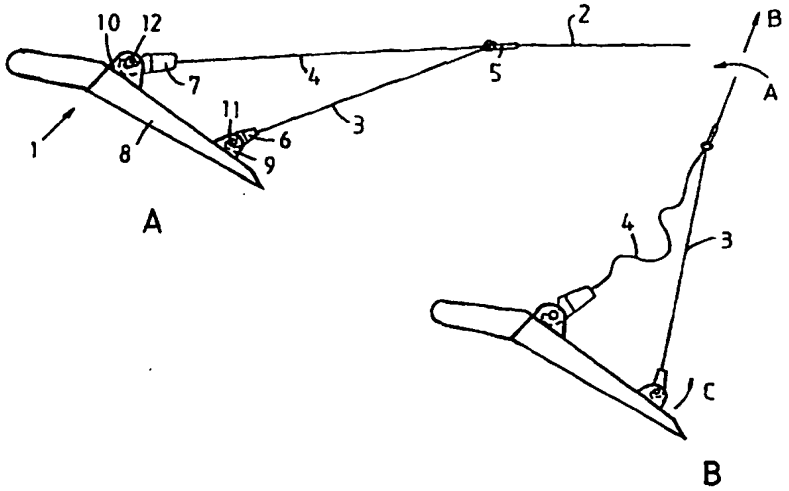
In English translation (filed in Dutch).

(54) Title: ANCHOR AND METHOD OF UNCOUPLING FOR SUCH ANCHOR



(57) Abstract

Anchor (1) with a fluke (8) with a longitudinal axis which extends from the rear end of the fluke (8) to its from end and with connection means for connecting the fluke with the lower end of an anchor line (2), which connecting means comprise an anchor shank (3, 4), the connecting means comprising at least one coupling (6, 7, 9, 10, 11, 12) with two cooperating coupling members (6, 7, 11, 12), the first of which being situated on the fluke side (11, 12) of the coupling and being directly or indirectly connected to the fluke in order to follow its movement and the second (6, 7) being situated on the anchor line side of the coupling and being directly or indirectly connected to the anchor line (2), the anchor (1) furthermore comprising operation means (17, 19) for the coupling which means are activated by swinging (A) the anchor line (2) held taut in order to change its angle with respect to the longitudinal axis of the fluke (8) and then to mutually displace the first (11, 12) and second (6, 7) coupling member from a coupling position to a position in which the second coupling member (6, 7) is released or emerges from coupling engagement with the first coupling member (11, 12), the second coupling member (6, 7) comprising a coupling hook (6, 7) which can be released by means of manipulation of the anchor line (2).

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CZ	Czech Republic	**LC**	Saint Lucia	**RU**	Russian Federation		
DE	Germany	**LI**	Liechtenstein	**SD**	Sudan		
DK	Denmark	**LK**	Sri Lanka	**SE**	Sweden		
EE	Estonia	**LR**	Liberia	**SG**	Singapore		

ANCHOR AND METHOD OF UNCOUPLING FOR SUCH ANCHOR

The invention relates to an anchor with a fluke and a shank, which shank can be rigid or composed of threads, and connected to an anchor line at the upper end.

Such anchors are used for mooring floating objects with respect to a water bottom, such as semi-submersibles used in the exploration and exploitation of sea-bottoms.

At installation, the anchors are lowered on the water bottom and then by exerting a pulling force on the anchor line which is connected to the upper end of the shank, pulled in the ground until the anchor is sufficiently far penetrated in there for supplying the required holding power. Said anchor line, up till then used as installation line, can, if so desired, be used for connecting the object and the anchor.

For certain anchoring systems, such as so-called vertical anchoring systems, it is desirable that the mooring or load lines exert a force on the fluke which is perpendicular to the fluke as much as possible and oriented through the surface centre of gravity of the fluke. This can be realized by moving the point of engagement of the installation line on the shank to a place further rearwards on the shank, or by swinging the shank in relation to the fluke. Alternatively an extra load line can be made use of, which line is attached to the anchor on the desired place beforehand, for instance on the fluke at the location of its surface centre of gravity. Examples of such solutions have been described in applicant's international patent applications PCT/NL92/00144 and PCT/NL93/00257, the contents of which should be considered inserted herein. International patent applications

PCT/GB92/02210 and PCT/GB96/01755 can also be referred to, from which anchors are known of which the angle between the shank and the fluke can be altered. In one embodiment this is realized by having the shank consist of two parts, one part extending obliquely to the fore being connected to the installation line and the other, upright part being connected to a (vertical) load line. By pulling the load line a pin breaks resulting in an uncoupling mechanism for the connection between the oblique shank part and the fluke being released. In another embodiment there is a shank, which, with the help of a removable wedge which is clamped between the shank and the fluke, is initially secured in an oblique position. By pulling an extra pulling line the bolt breaks after which a bar provided with a wedge at its bottom end can be slid upwards along the shank in order to lift the wedge, after which the shank can be turned upright. In yet another embodiment the angle is enlarged by swing-pulling the shank from the installation position to a vertical position with the help of the anchor line, by swing-pulling the shank and having a connection between the shank and the fluke fail therewith.

It can also be desired to retrieve the installation line after having pulled an anchor into the ground, possibly together with the shank. For connecting (the rest) of the anchor with the object, an extra anchor line has then already been attached to the fluke or with the shank (when it remains connected to the fluke). The connection between the installation line and the shank or either the connection between the shank and the fluke can be adapted to that end in order to fail at a certain pulling force. Alternatively the connection shank-fluke can be remotely operable for uncoupling, for instance with an extra pulling line. Examples of anchors which have been adapted to that end have been described in the aforementioned international patent application PCT/NL92/00144.

It can furthermore be desirable to alter the angle between the shank and the fluke in order to be able to pull the anchor, at least the fluke, out of the ground to be able to use the (valuable) anchor again. From the international patent application PCT/NL92/00144 an anchor is known of which the shank is connected to the fluke on two locations spaced apart in longitudinal direction of the fluke, one of the connections being remotely detachable, for instance with an extra pulling line or in an acoustic manner, and the other, preferably foremost connection is a hinge. By releasing the connection mentioned first the fluke will only be connected to the fluke at the location of the hinge connection, wherein the fluke can direct itself in an orientation of the lowest resistance when pulling out the anchor. In one embodiment the connection mentioned first is also adjustable, because of which the angle between the shank and the fluke can be enlarged in order to be able to deploy the anchor in the aforementioned vertical anchoring systems.

For all these conversions it is necessary to have a part fail before the connection concerned can be uncoupled and/or special aids, such as pulling lines, acoustic means and hydraulic means are necessary. In this way, on the one hand, there is the risk that the connection concerned releases at an unforseen exceeding of the failure limit of the part (long) before such is desired and the anchor has to be hauled in again in order to install it again or that a future possibility of conversion has to be given up. If one would want to avoid this risk -if at all possible- one would have to manoeuvre the anchor very carefully.

On the other hand the aids mentioned make the anchor expensive and prone to damage and therefore sensitive to disturbance regarding the conversion function.

An objective of the invention is to provide an anchor in

which in a simple and reliable way, at the desired moment, one of the types of conversions mentioned, from the installation stage to the user stage or from the user stage to the hauling-in stage, can take place. Furthermore it is an objective of the invention to provide a method for this.

To that end the invention provides an anchor with a fluke with a longitudinal axis which extends from the rear end of the fluke to its front end and with connection means for connecting the fluke with the lower end of an anchor line, which connection means comprise an anchor shank, the connection means comprising at least one coupling with two cooperating coupling members, the first of which being situated on the fluke side of the coupling and being directly or indirectly connected to the fluke in order to follow its movement and the second being situated on the anchor line side of the coupling and being directly or indirectly connected to the anchor line, the anchor furthermore comprising operation means for the coupling which means are activated by swinging the anchor line held taut in order to change its angle with respect to the longitudinal axis of the fluke and then to mutually displace the first and second coupling member from a coupling position to a position in which the second coupling member is released or emerges from coupling engagement with the first coupling member, the second coupling member comprising a coupling hook which can be released by means of manipulation of the anchor line.

In the anchor according to the invention the connection to be uncoupled can be released in a simple way and only at will by swinging the anchor line, which can either be an installation line or a load line.

Preferably the coupling is adapted such, that at a further pulling of that same anchor line, so in a smooth con-

tinuous movement, both coupling members are removed entirely from one another and the parts of the anchor which are connected with them, respectively, are brought at a distance from one another.

Preferably the operation means are adapted for having the second coupling member pivoted from the coupling position to the release position. In this way the turning movement of the anchor line can be efficiently used for uncoupling, without complicated transfer mechanisms being necessary.

In a further embodiment of this the first coupling member comprises a pin about which a coupling hook engages, the operation means being adapted for having the hook pivoted about an axis, which is parallel to and at a distance from the pin. Such a connection which can be uncoupled is very simple in construction and action and can be applied on different locations in the anchor without complicated additional provisions for it.

The operation means then preferably comprise a first stopping face which, at least as long as the hook and the pin are coupled to one another, is stationary with respect to the pin as well as a second stopping face on the hook integrated therewith, the first stopping face forming a limitation for the displacement of the second stopping face at pivoting the hook about the pin and therewith forming a fulcrum for the hook.

The second stopping face preferably is situated at at the most 180° in circumferential direction of the hook spaced from the end of the hook to facilitate the release from the hook.

Preferably the pin is provided with a flattening at the side of the pin which is facing away from the hook opening, to further the last stage of the release.

The coupling according to the invention can advantageously be applied to effect an enlargement of the angle between the two portions of the anchor. In that case the connection means comprise a second permanent, latently present connection, between the parts of the anchor connected by both coupling members, which connection extends parallel to the coupling formed by the coupling members, and becomes active after releasing the coupling.

Said connection may be a cable or chain, or a rigid element, which can be extended or folded out.

In the latter case, in case of a hook-shaped second coupling member, this hook may be pivotably though permanently attached to an end of an elongated, rigid intermediate member by means of a second pin, which member is pivotably connected to a part of the anchor which forms a rigid whole with the pin, at the other end by means of a third pin, the pin being situated between the second and the third pivot pin in the coupling position.

In a possible further development of this the intermediate member comprises a longitudinal groove which is concentrical with respect to the pin and in which the second pin is able to slide until abutment, the abutment with the second pin subsequently forming a fulcrum for the hook.

In another possible further development the second pin is fixedly connected to the intermediate member and the hook pivots about the second pin at uncoupling.

Further advantageous embodiments of the anchor and the method according to the invention are subject of the claims and of the description of a number of the examples shown in the attached drawings following hereafter.

Shown is in:

Figures 1A-D a first exemplary embodiment of an anchor according to the invention in consecutive stages;

Figures 2A-G an exemplary embodiment of a coupling of the anchor according to the invention, in consecutive stages in cross section, as well as an alternative embodiment;

Figures 3A-D a shank angle adjustment mechanism which is situated at the upper end of a shank, during consecutive stages;

Figures 4A, 4B and 4C an alternative shank angle adjustment mechanism in which the coupling according to the invention is included;

Figures 5A-D another exemplary embodiment of the anchor according to the invention, in which the coupling is used to easily haul in the anchor;

Figure 6 a detail of a possible embodiment of the coupling in a anchor according to the invention;

Figures 7A-C an anchor according to the invention which is provided with various couplings; and

Figure 8 another example of the anchor according to the invention.

In the figures 1A-D the anchor 1 comprises a fluke 8, on which fixed points of suspension or supports 9 and 10 have been attached, each of which consisting of two upright plates between which pins 11 and 12, respectively, have been attached. It will be understood that two or more supports 9 and two or more supports 10 are present. Each of these supports forms a point of attachment for the lower ends or sockets of the shank wires 3 and 4, which come together at the top at the location of shackle 5, on

which the lower end of an anchor line 2 has been attached. Hook-shaped attachments 6 and 7 have been applied onto the lower ends of the shank wires 3 and 4 of which attachments the hooks exactly fit the aforementioned pins 11 and 12. In the situation shown in figure 1A the hooks 6 and 7 are confined on the pins 11 and 12, as a result of appropriate design of the hooks and the supports. This will be further gone into in the discussion of the figures 2A-E.

In figure 1A the position is shown at the final stage of having the anchor 1 penetrate. It is often desired to be able to use the anchor line 2 used for the installation, again. For this anchor line is not always suitable for use during the actual anchoring or is too expensive for that. It will then be advantageous if the fluke 8 is attached to the object to be anchored with another anchor line, the load line or mooring line, for instance in a vertical anchoring system such as is discussed in the International patent applications mentioned in the preamble. In these figures an attachment for such a load line is not shown, but it will be understood that it will then be present.

This concerns winning back the installation line 2 in an easy way, with shank wires 3, 4 with it as well. To that end the vessel with which the installation line 2 is connected is sailed to the left as seen in the drawing, because of which line 2, while pulling it taut in the direction B, swings in the direction A. As a result the shank wires 4 will slacken and the shank wires 3 remain taut. The foremost hooks 6 will pivot in the direction C. At a certain moment (see figures 2A-E) the hook 6 will have been urged off the pin 11 and be released, after which, at continued pulling in the direction B and continued swinging in the direction A the shank wires 4 will tauten. At continued swinging in the direction A the same procedure will now follow for the hooks 7 with respect to the pin 12, until the situation shown in figure 1D is

reached and both shank wires 3 and 4 are loose from the fluke 8.

In the figures 2A-E it can be seen how the hooks 6 get loose. The hook 6 shown here is still coupled to the support 9 with the pin 11 in figure 1A. As can be seen in the cross section of figure 2F, the support 9 is formed like an upright plate with a hole 16, in which the pin 11 has been inserted. On the hook 6 plates 6a, 6b have been welded on both sides, which plates serve to make sure that the pin 11 cannot be released. Moreover the plates 6a, 6b ensure a strengthening of the hook 6, so that the pulling forces can be transferred without deformation of the hook during installation.

Below the pin 11 there is a bottom 14 (figure 2A), which is circular and has a curve in the portion 14a, the confinement portion, which curve corresponds to one which is concentric with regard to the central axis of the pin 11 and a portion 14b which diverges to the outside with respect of the confinement portion. At the right hand end the portion 14b merges into a horizontal plane 15, which slopes out of there. The pin 11 is furthermore provided with a bevel 13 at the release side for the hook. At the upper end the plate 9 is provided with a cam 17, which is situated in a same vertical plane as the cam 19 formed within the hook 6 (not shown in figure 2F). At pivoting in the direction C of the hook 6 the cams 17 and 19 will, as can be seen in figure 2B, abut one another in order to form a fulcrum 20 for the hook at further pivoting (figure 2C) in C', which fulcrum is at a distance from the central axis of the pin 11. The end 18 of the hook 6, which lies at 180° of the fulcrum 20 (as regarded about pin 11) will then want to come apart from the pin 11, which is made possible by the spacious curvature of the plane 14b. At further pivoting according to C' the hook-shaped end 18 gets more space as a result of the receded plane 15 and

finally the situation shown in figure 2E is realized, in which the end of the hook as a result of the bevel 13 can move upwards along the pen 11 and away from the support 9. It will be understood that a comparable arrangement can be applied with the hindmost support 10 on the fluke 8, for the hook 7, which will then be pivoted in the direction D.

In figure 2G a simple alternative for the coupling of the figures 2A-G has been shown. The confinement portion 14a is replaced here by confinement cam 14c which is welded to the plate 9. The end 18 can pivot along the cam 14c to the outside when the fulcrum 20 has been realized.

In the figures 3A-D a so-called shank angle adjuster 31 has been shown, as for instance described in applicant's International patent application PCT/NL93/00257. By means of socket 40 at the location of the hinge pin 41, the anchor line 32 is permanently attached to one end of an elongated plate 35, at the other end of which by means of hinge pen 38 a shackle 37 for the hindmost shank wires 34 has been attached. There could be two plates 35, lying next to each other and determining between them a receiving space for a second plate 36, which is hingably connected with the plate 35 at the location of the hinge pin 38 and is provided with a fixed pin 39 reaching up to the inner surface of the plate 35. At the location of the hinge pin 43 the plate 36 is furthermore connected with shackle 42 for foremost shank wires 33.

Special now is that at the lower end the end block 40 is provided with a hook 44, which during installing the anchor, including the shank wires 33, 34, engages the pin 39 as a result of the pulling direction. In this way the plates 35 and 36 are kept together in a folded state. With the pin 39 the hook 44 forms a locking mechanism here which can be uncoupled.

If the anchor line 32 pulled taut is now pivoted in the direction E, the tension will continue to exist in the foremost shank wires 33 and these will sway along to a more upright position. The plates 35 and 36 will also swing along in a anticlockwise direction. Because of the slackening of the shank wires 34 the anchor line 32 can come in (pulling) line (F) with the foremost shank wires 33. The location of the pin 39 is now such with respect to that pulling line, that the hook 44 has come free from the pin 39, which, for that matter, can be provided with a bevel to advance the moment of release.

Subsequently the plate 36 can tilt about the hinge pin 38 in the direction G to the situation shown in figure 3D, in which the distance between the pivot pin 41 and the shackle 42 has been enlarged and as a result the shank formed by the shank wires 33 and 34 can be arranged at a larger opening angle with respect to the fluke than was the case in the situation in figure 3A.

In the figures 4A and 4B the anchor 51 has been provided with a fluke 58 with foremost supports 59 and hindmost supports 60, which have been provided with pins 61 and 62 respectively, all this in accordance with the anchor of the figures 1A-D. By means of shackle 55 the anchor line 52 is connected to the foremost and hindmost, respectively, shank wires 53, 54, the hindmost shank wires 54 being fixedly though hingably by means of end block or socket 57 through pin 62, connected with support 60 on the fluke 58. The foremost shank wires 53, however, are provided with sockets with hooks 56, which may largely correspond with the hook of the figures 2A-E. The same goes for the support 59: it may correspond with support 9.

Special now is that within the sides, the hook 56 is provided with pin 66 which pin is slidably accommodated in slot 70 which has been made in a buckled elongated plate

65, which at the other end at the location of hinge 68 is connected to the support 67 which is fixed to the fluke 58. In the situation shown in figure 4A the slot 70 runs according to a curve which is concentric to the central axis of the pin 61. The hook 56 is furthermore provided with two joined side plates 56a, b, just like the hook 6 discussed earlier.

When the anchor line 52 is pulled tighter in the direction I and swung in the direction H the hook 56 will pivot along, the pin 66 running to the left in the slot 70. When the pin 66 reaches the end limit 69 of the slot 70 a fulcrum is realized there, which can be compared to fulcrum 20 in the figures 2C-E. With on-going swinging in the direction H the hook 56 is released, but because the pin 66 remains confined in the elongated plate 65 and because of that the hook remaining connected, though indirectly by means of 68, to the fluke 58, the effect will be that the distance along the foremost shank wires 53 between the shackle 55 and the fluke 58 is enlarged, resulting in the shank angle opening to the fore being enlarged. In the case shown in figure 4B the anchor 51 can be used for an anchoring system in which pulling perpendicular to the fluke takes place. Instead of the rigid plates 65 a flexible chain or cable can also be used, which has been connected to the hook and the fluke.

In the figures 5A-D yet another example is shown of an anchor 71, which, at the lower end of the foremost shank wires 73, is provided with a shank angle adjuster 80, 81 and a detachable coupling according to the invention. The hindmost shank wires 74 are permanently though hingably connected to the fluke of the anchor. By swinging the anchor line 72 in the direction J and simultaneously pulling in the direction K, K' the hook 76 is released from the pin 81 of the support 79. This construction is comparable to the one of figures 1A-D and 2A-E or 2G.

In figure 6 a connecting device 90 according to the invention has been shown, which can be found at the upper end of the shank, here consisting of foremost and hindmost shank wires 93, 94, respectively. The device 90 comprises one or more parallel plates 113', to which various shackles for various wires or anchor lines have been attached. At the location of the pivot pin 99, the hindmost shank wires 94 are connected to the device 90 by means of eye 95 en shackle 97 whereas the foremost shank wires 93 have been connected to it by means of eye 96 and shackle 98 with hinge pen 100. Furthermore a (vertical) load line 91 has been connected to the device 90 by means of shackle 103 and pivot pin 104. At the other end the installation line 92 has been connected to the device 90 by means of hook 101 and pin 102. The lower end of the hook 101 is kept confined between the pivot pin 102 and wedge 112. This wedge 112 itself is held confined between shackle 98 and hook 101 and is connected to an operating rod 110, at the location of pivot pin 111 which rod is povitably connected to lever 107 at the other end at the location of 109, which lever has been pivotably connected to the device 90 by means of pivot pins 108. By means of pivot pin 106 the other end of the lever 107 is connected to protrusion 105, which has integrally been formed with the shackle 103.

After having the anchor penetrated until in the correct position with the help of the installation line 92, one would want to win back the installation line 92 and tighten the load line 91. When the load line 91, which is also to be regarded as an anchor line, is swung in the direction L the pivot pin 106 will pivot along in the direction M and the pivot pin 109 will counter-pivot in the direction N. As a result of this the rod 110 will slide in the direction O, as a result of which the wedge 112 will be pulled out of the space between the shackle 98 and the hook 101, thus providing downward space for the

hook 101. The hook 101 can now become released from the pin 102, for instance by falling downwards or by pulling the line 91 further. The removal can also be promoted by swinging the installation line 92 in the direction P. The installation line 92 can be hauled in after that and the load line 91 be further tightened, also resulting in the position of the pivot pins 99 and 100 being altered and the shank angle being enlarged.

In the figures 7A-C the principle according to the invention is applied in multiple ways. The anchor 200, of the so-called Stevpris type, which type is available with applicant, has a fluke 204 and a rigid shank 213 which consists of two similar plates, in which - as is schematically shown - at half level, a pin is 206 has been attached on both plates, and in which at the upper end the plates are connected to one another by means of pin 205. A hook 211 engages, about the pin 205 which hook has been attached to the anchor line 202, which is used during installation. At the location of 208 the upper end of the hook 211 however is still connected to two extension parts 203a, 203b of the anchor line 202, which extension parts 203 are each connected to a similar hook 212 at the location of 209. These hooks 212 engage about the respective pivot pins 206 in the way described above and are confined in lateral direction. The hooks 212 each are connected to further extension parts 204a, b of the anchor line at the location of 209. Finally these extension parts 204a, b are connected to the upper end of the shank 213 at the location of 210.

When it is desired to use the anchor after installation in anchoring systems in which pulling substantially perpendicular to the upper surface of the fluke has to take place, the installation line 202 is swung about in the direction Q while exerting pulling forces in the direction R. In the way described before the hook 211 will then,

because of the fact that the anchor 200 is kept in position by the ground, pivot about the pin 205 and be released. Then the situation shown in figure 7B has been reached, in which the anchor line 202, 203a, b has been connected to the anchor 200 by hook 212 and the pin 206. That situation is the situation of use, in which the anchor line 202 almost coincides with the line X which is perpendicular to the surface of the fluke 214 and goes through its surface centre of gravity.

When it is desired to haul in the anchor 200 again, the anchor line 202 is swung further again in the direction Q in order to have the hooks 112 released from the pins 206 in the way described earlier. Then the point of engagement of the anchor line 202 203a,b, 204a, b is moved to point 210 at the top of the shank, and the anchor 200 can be pulled out of the ground with a sufficiently oblique position of the anchor line.

It will be understood that the coupling mechanism according to the invention as well as its operating means can have a multitude of shapes. By way of example, as shown in figure 8, in an anchor 301 with a fluke 318 and a rigid shank 303 a lever mechanism can be provided, which extends along the shank to a hindmost point of attachment 311 of the shank on the fluke. The lever mechanism works thus that the swinging in the direction S of the taut anchor line 301 pivots the shackle 305 about pivot pin 306, in which the levers 307 which are fixed with the shackle 305 for pivoting therewith pivot along. The arm 307 is hingably connected to rod 309 by pin 308, which rod slides in the direction T. A coupling, which is not further indicated, is situated at the location of the attachment 311 with which coupling the second coupling member is moved in relation to the fixed first coupling member with the fluke to uncouple it and to release the attachment 311. The shank 303 then remains connected to the fluke 308 with

the foremost hinge connection 310.

In many cases the most advantageous approach will be to swing the anchor line in a direction which enlarges the angle with the fluke at uncoupling. It will be understood that it will however also be possible to adapt the coupling such that swinging in the opposite direction is necessary.

(AF/NG 4785)

Claims

1. Anchor with a fluke with a longitudinal axis which extends from the rear end of the fluke to its front end and with connection means for connecting the fluke with the lower end of an anchor line, which connecting means comprise an anchor shank, the connecting means comprising at least one coupling with two cooperating coupling members, the first of which being situated on the fluke side of the coupling and being directly or indirectly connected to the fluke in order to follow its movement and the second being situated on the anchor line side of the coupling and being directly or indirectly connected to the anchor line, the anchor furthermore comprising operation means for the coupling which means are activated by swinging the anchor line held taut in order to change its angle with respect to the longitudinal axis of the fluke and then to mutually displace the first and second coupling member from a coupling position to a position in which the second coupling member is released or emerges from coupling engagement with the first coupling member, the second coupling member comprising a coupling hook which can be released by means of manipulation of the anchor line.

2. Anchor according to claim 1, the coupling being adapted such that after release from the coupling hook the latter can be entirely lifted away from the first coupling member by pulling the anchor line.

3. Anchor according to claim 1 or 2, the operation means being provided with means for - in the displacement mentioned - urging away the second coupling member from the first coupling member.

4. Anchor according to claim 1 or 2, the operation means being adapted for having the coupling hook pivot from the coupling position to release position, the first coupling member preferably comprising a pin about which the coupling hook engages, the operation means being adapted for having the hook pivot about an axis, which is parallel to and at a distance from the pin.

5. Anchor according to claim 4, the operation means comprising a first stopping face which at least as long as the coupling hook and the pin are coupled to one another is stationary with respect to the pin as well as a second stopping face on the hook integrated therewith, the first stopping plane forming a limitation for the displacement of the second stopping plane at pivoting the hook about the pin and therewith forming a fulcrum for the hook.

6. Anchor according to claim 5, the second stopping plane being at the most 180 degrees in circumferential direction of the hook spaced from the end of the coupling hook.

7. Anchor according to claim 5 or 6, the pin being provided with a flattening at the side of the pin facing away from the hook opening.

8. Anchor according to any one of the preceding claims, the connection means comprising a second permanent, latently present connection, between the parts of the anchor connected by both coupling members, which connection extends parallel to the coupling formed by the coupling members, and becomes active after releasing the coupling.

9. Anchor according to claim 8, the connection mentioned being a cable or chain.

10. Anchor according to claim 8, the connection mentioned

being a rigid element which can be extended or folded out.

11. Anchor according to claim 4 and 10, the coupling hook being pivotably though permanently attached to the end of an elongated, rigid intermediate member by means of a second pin, which member at the other end by means of a third pin is pivotably connected to a part of the anchor which forms a rigid whole with the pin, which is situated between the second and the third pivot pin in the coupling position.

12. Anchor according to claim 11, the intermediate member comprising a longitudinal slot which is concentrically situated with respect to the pin and in which the second pin is able to slide therein until abutment, the abutment with the second pin subsequently forming a fulcrum for the coupling hook.

13. Anchor according to claim 11, the second pin being fixedly connected to the intermediate member and the hook pivoting about the second pin at uncoupling.

14. Anchor according to any one of the preceding claims, the first coupling member being attached to the fluke and the second coupling member being attached to the lower end of the shank.

15. Anchor according to claim 14, the shank being connected to the fluke with at least two hinge connections spaced in the direction of the longitudinal axis, at least the front hinge connection being constructed as the aforementioned coupling.

16. Anchor according to claim 15, the other, rear positioned hinge connection also being constructed as the aforementioned coupling.

17. Anchor according to claim 16, the second coupling member of the front hinge connection being a part of the operation means for the rear hinge connection.

18. Anchor according to claim 14, the operation means comprising a lever mechanism which is pivotably mounted on the anchor and being in contact with a portion of the second coupling member which confines the first coupling member in order to displace it with respect to first coupling member for its releasing.

19. Anchor according to claim 18, the shank being connected to the fluke with at least two spaced hinge connections spaced in the direction of the longitudinal axis, at least the rear hinge connection being constructed as the aforementioned coupling.

20. Anchor according to claim 19, the lever mechanism extending from the rear hinge connection along the shank to the upper end thereof and being connected there for co-rotation with a shackle for an installation line.

21. Anchor according any one of the preceding claims 1-13, the coupling being situated between the shank and the anchor line.

22. Anchor according to claim 21, the shank being built of elongated elements which extend between the fluke and the anchor line, at least two elongated elements being pivotably attached with their lower ends to the fluke at positions spaced in longitudinal direction and being pivotably attached with their upper ends to a first rigid elongated coupling plate on spaced positions, a second rigid elongated coupling plate being hingably connected at one end to the first coupling plate and at a distance thereof forming the coupling with the first coupling plate.

23. Anchor according to claim 22, the hinge connection between the two coupling plates coinciding with the connection between the rear elongated element and the first coupling plate.

24. Anchor according to claim 21, 22 or 23, the shank being provided at the top with a connection for an installation line and of a connection for a mooring or load line, the connection for the installation line being provided with the coupling and the operation means for the coupling being activated by pivoting the load line.

25. Anchor according to claim 24, the operation means comprising a lever mechanism, pivotably arranged on the shank and the first coupling member having a portion, such as a wedge, confining the second coupling member being in contact with the lever mechanism in order to be displaced thereby with respect to the second coupling member for its releasing.

26. Anchor according to claim 21, the shank being rigid and the coupling being provided at the upper end of the shank, the anchor line further being connected with the shank on a location between the fluke and the upper end of the shank by means of a latently present extension.

27. Anchor according to claim 26, said location being almost perpendicularly located above the surface centre of gravity of the fluke.

28. Anchor according to claim 26 or 27, the latently present extension being connected to the shank on the said location by means of a second coupling.

29. Anchor according to claim 28, either the anchor line or the extension being connected to the upper end of the shank by means of a second latently present extension.

30. Anchor according to any one of the preceding claims, the coupling and the operation means being adapted for uncoupling in a non-destructive manner.

31. Anchor according to any one of the preceding claims, the pivoting of the anchor line for the uncoupling taking place by enlarging the forwardly opening angle between the anchor line and the longitudinal axis of the fluke.

32. Anchor according to any one of the preceding claims, a resistance such as a spring being included in the coupling in order to prevent unintended release when an uncontrolled swinging of the anchor line occurs.

33. Anchor in which one or more of the characterizing features described in the description and/or shown in the figures have been realized.

34. Method for uncoupling a coupling or lock in the connection between the fluke of an anchor and an anchor line, the anchor line being swung around in tightened state and thereby inducing the uncoupling.

35. Method as described in essence in the description and/or shown in the figures.

(AF/NG 1440)

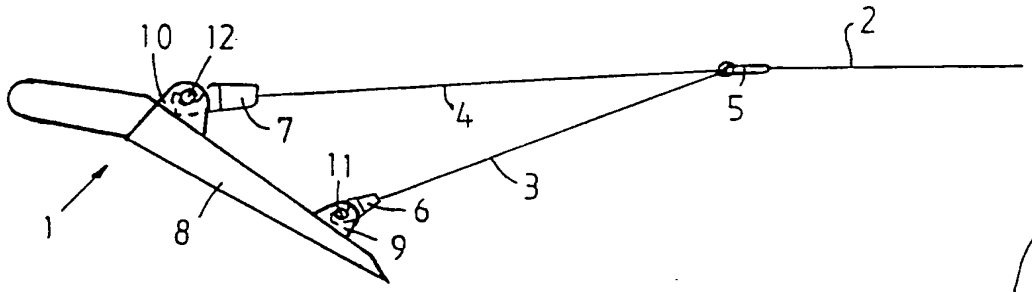


FIG.1A

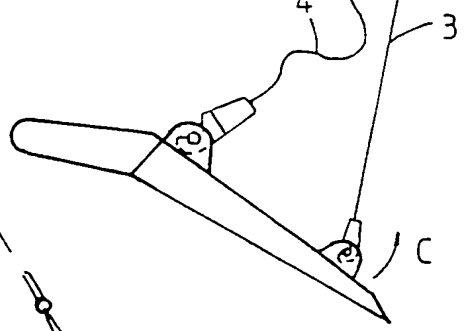


FIG.1B

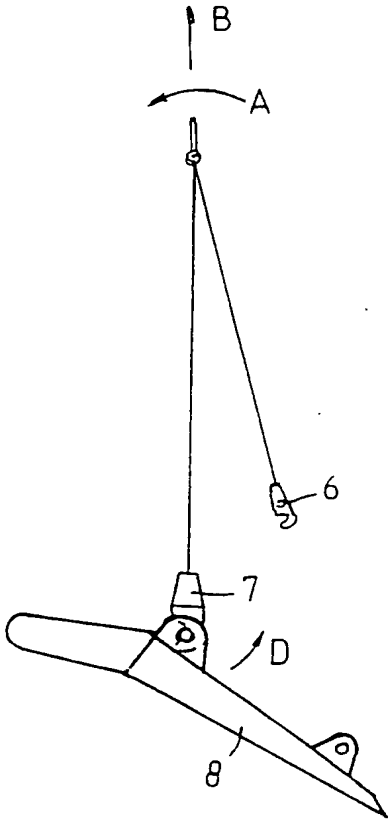
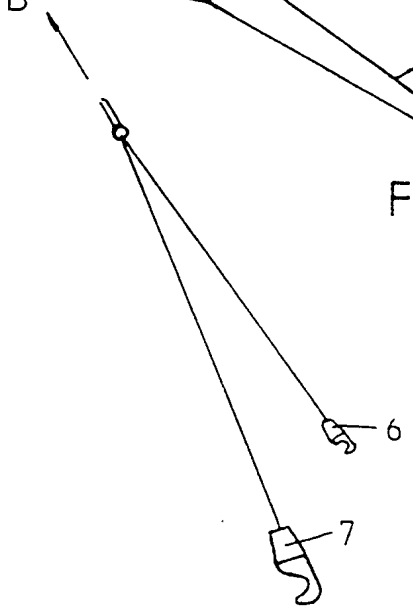


FIG.1C



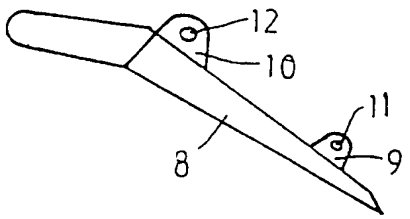


FIG.1D

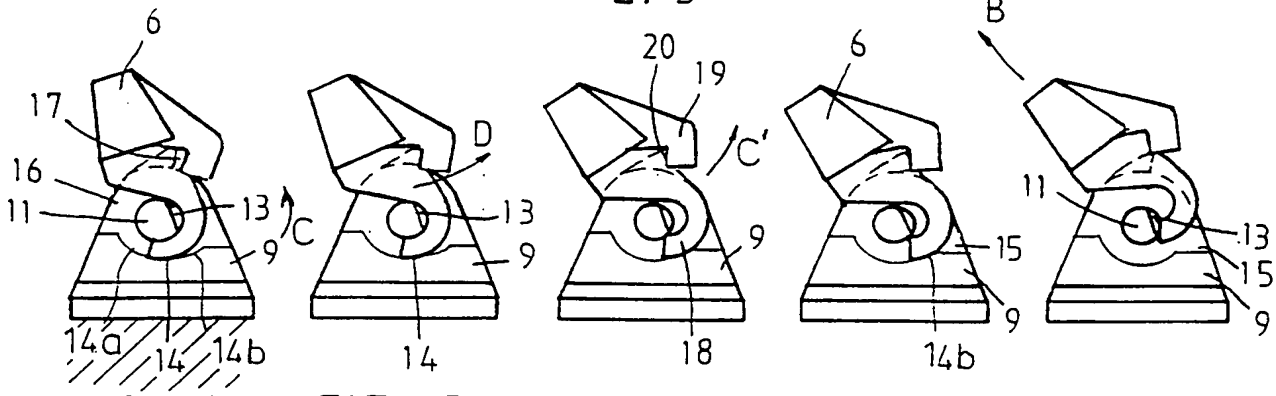


FIG. 2A FIG. 2B FIG. 2C FIG. 2D FIG. 2E

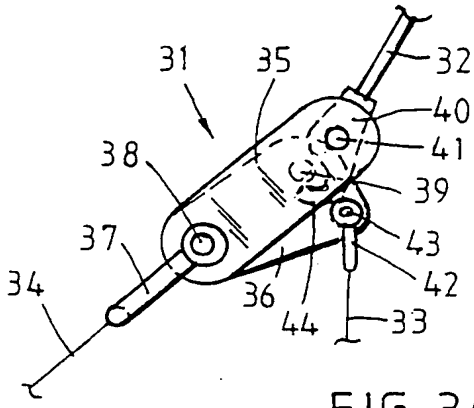


FIG. 3A

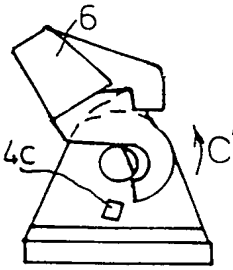


FIG. 2F

FIG. 3B

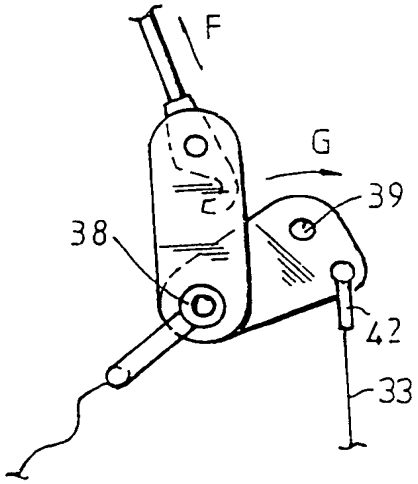


FIG. 3C

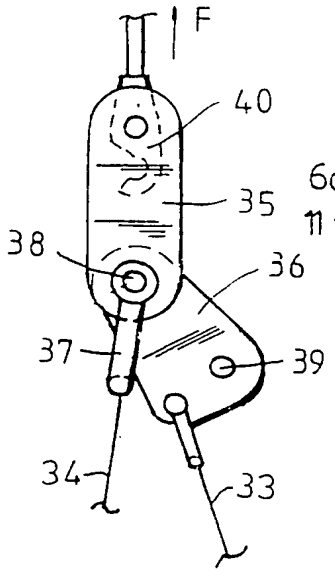


FIG. 3D

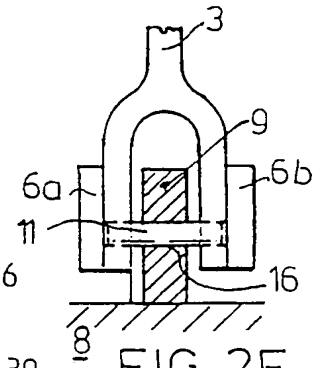


FIG. 2F

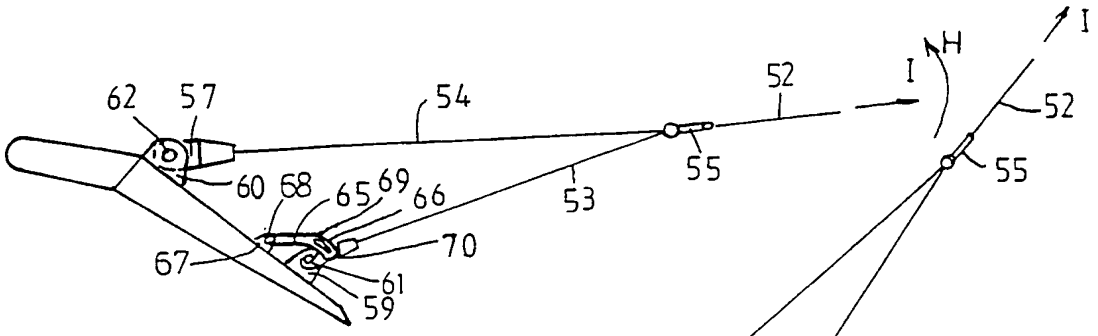


FIG. 4A

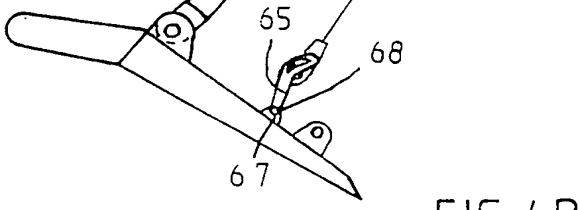


FIG. 4B

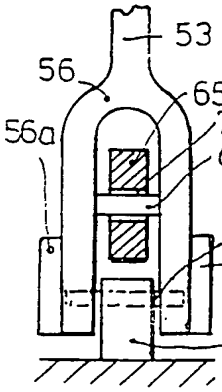


FIG. 4C

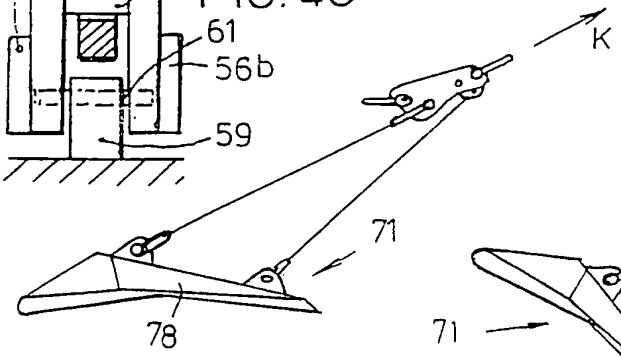


FIG. 5A

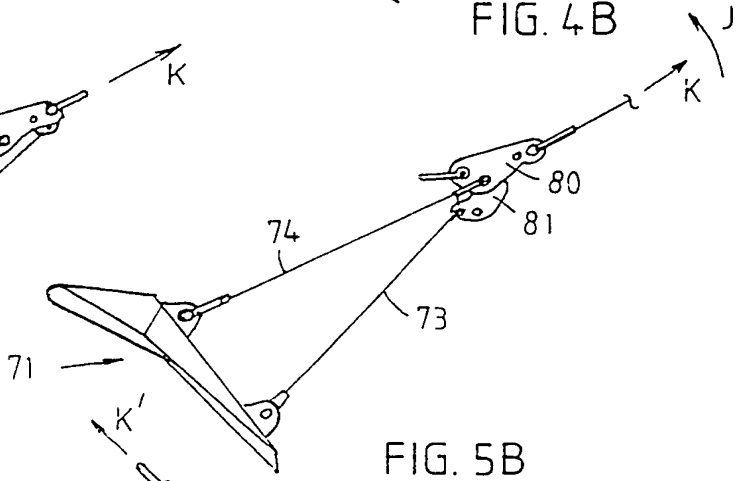


FIG. 5B

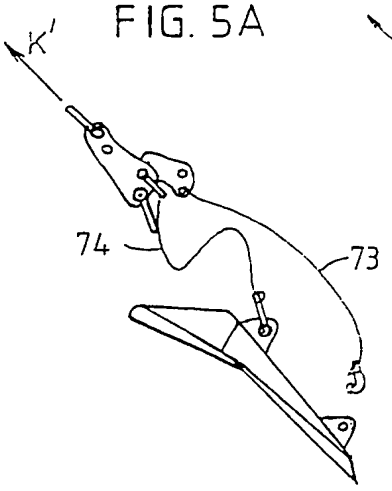


FIG. 5C

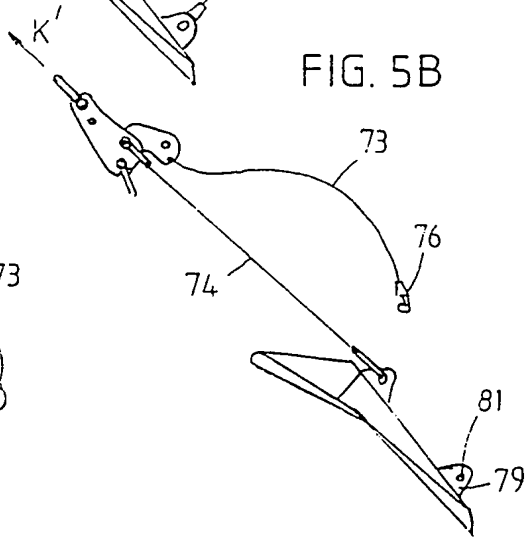


FIG. 5D

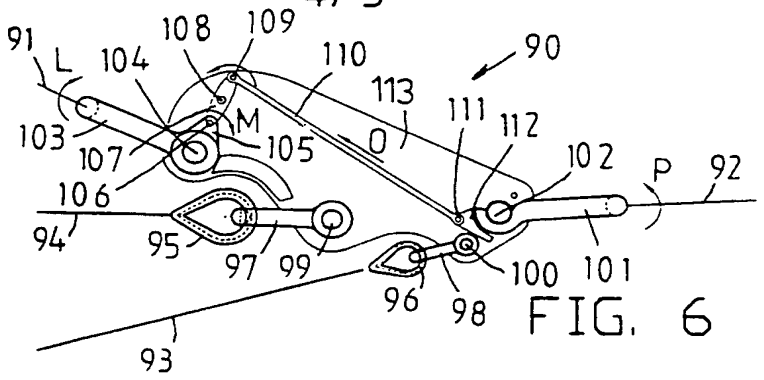


FIG. 6

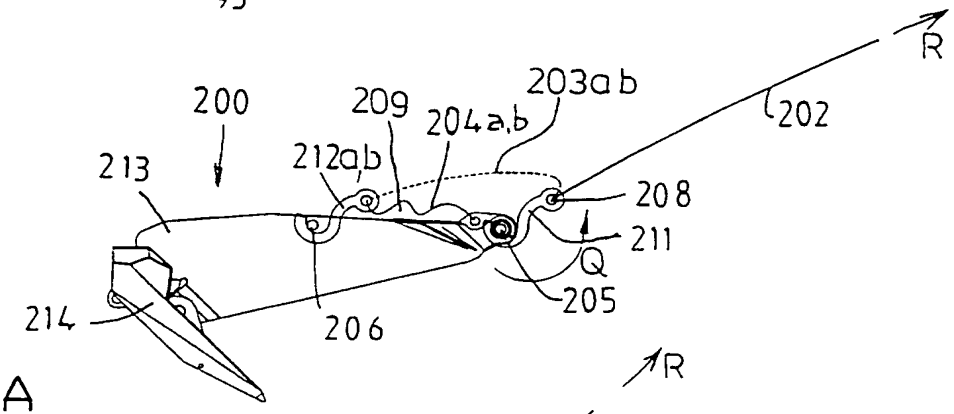


FIG. 7A

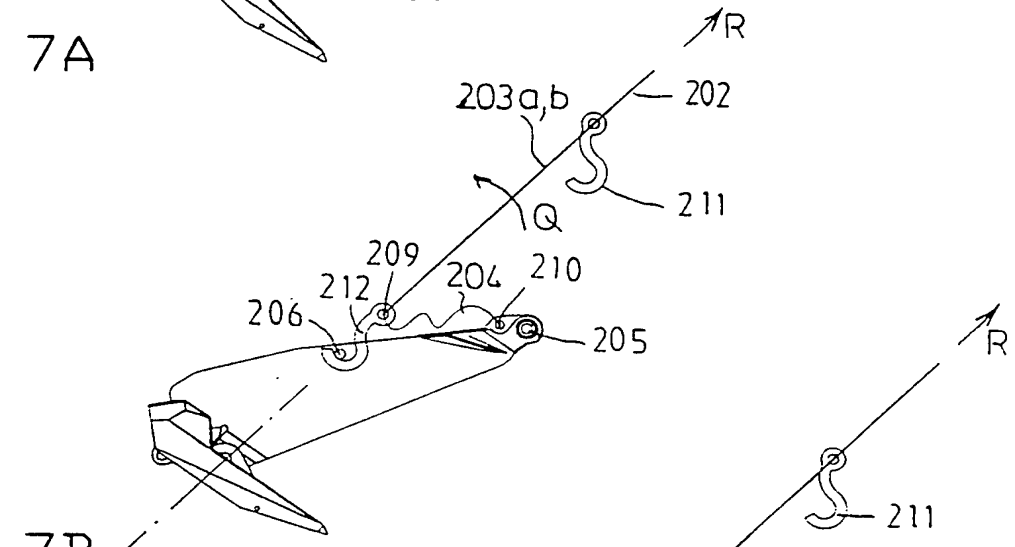


FIG. 7B

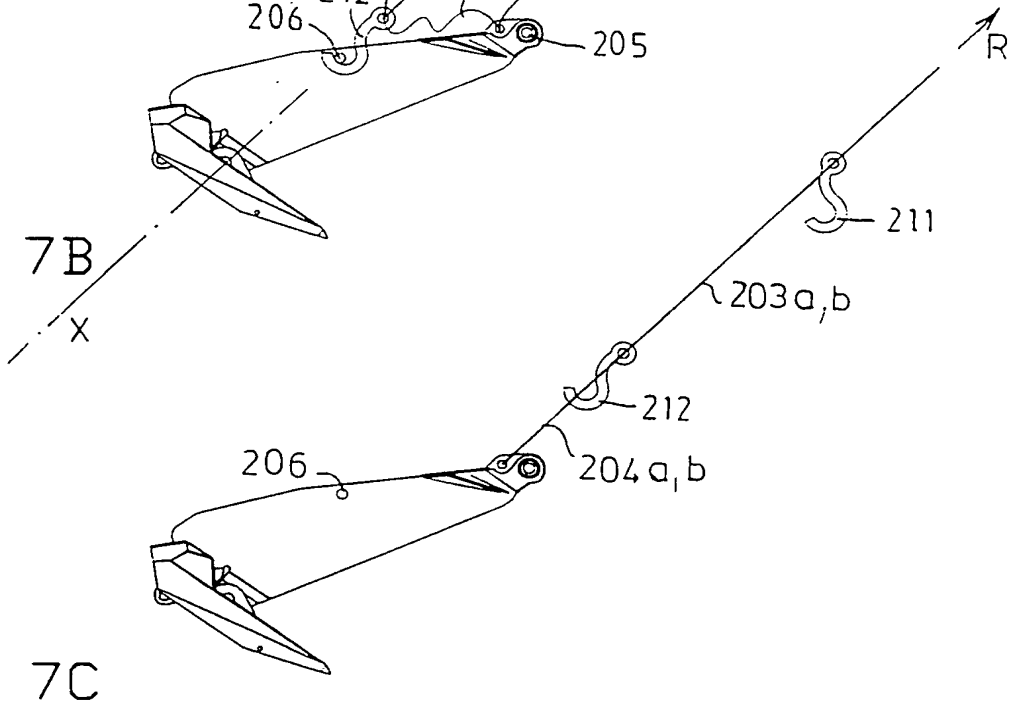


FIG. 7C

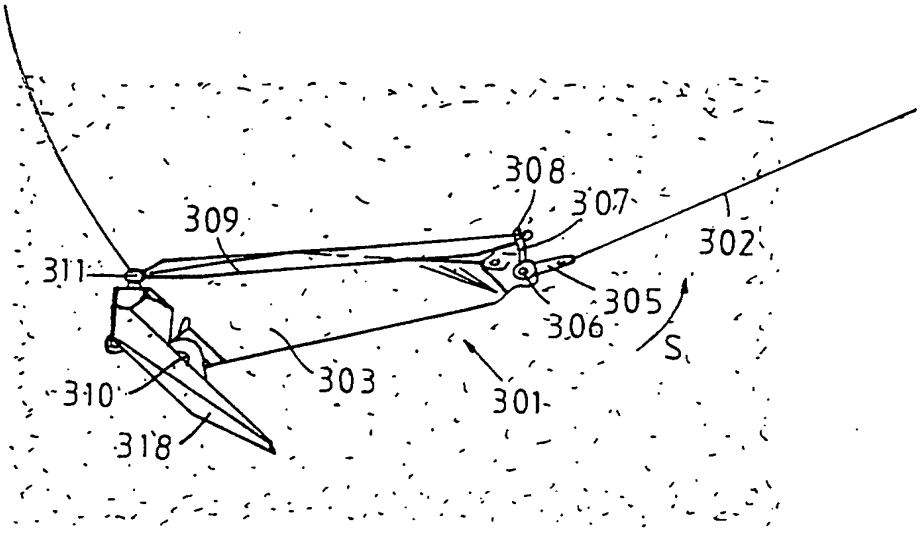


FIG. 8

INTERNATIONAL SEARCH REPORT

Int. ional Application No
PCT/NL 98/00102

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 B63B21/46 B63B21/22 //E02D5/80

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 B63B E02D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	PATENT ABSTRACTS OF JAPAN vol. 15, no. 485 (M-1188), 9 December 1991 & JP 03 208791 A (K. HIKITANI), 11 September 1991, see abstract; figures 1-7	1,4,30, 31,33-35
A		14,15, 18,19

X	PATENT ABSTRACTS OF JAPAN vol. 9, no. 206 (M-406), 23 August 1985 & JP 60 067289 A (SOUJIROU NAKAMURA), 17 April 1985, see abstract; figures 1-5	33-35
A		1-4,8,9, 14,21, 26,30,31

	-/--	

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

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"O" document referring to an oral disclosure, use, exhibition or other means

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Date of the actual completion of the international search	Date of mailing of the international search report
16 June 1998	24/06/1998

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Häusler, F.U.

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Int. ional Application No
PCT/NL 98/00102

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 3 450 088 A (W. GUIER) 17 June 1969 see figures 1-4	33-35
A		1,2,4, 14,15,30

X	FR 2 644 748 A (J. DUCLOUX) 28 September 1990 see the whole document	34
A		1,18,20, 25,30-32

X	US 2 007 667 A (G.E. STUBBS) 9 July 1935 see figures 1-4 see page 1, right-hand column, line 38 - line 54	33-35
A		1,30,31

X	US 4 230 062 A (P.J. FORNASIERO) 28 October 1980 see the whole document	33-35
A		1,18,20, 25,30,31

A	WO 93 03958 A (VRIJHOF ANKERS BEHEER B.V.) 4 March 1993 cited in the application see figures 1-3,10,11 see figures 19-23D see page 17, line 18 - page 19, line 12 see page 21, line 33 - page 22, line 25	1,8,9, 14,19, 22,26, 27,30,34

A	EP 0 297 703 A (S. KOBAYASHI) 4 January 1989	

1

INTERNATIONAL SEARCH REPORT

Information on patent family members

Int. ional Application No
PCT/NL 98/00102

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 3450088 A	17-06-1969	NONE	
FR 2644748 A	28-09-1990	NONE	
US 2007667 A	09-07-1935	NONE	
US 4230062 A	28-10-1980	NONE	
WO 9303958 A	04-03-1993	NL 9101396 A	16-03-1993
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		AU 2589792 A	16-03-1993
		BR 9206368 A	17-10-1995
		GB 2273690 A,B	29-06-1994
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		GB 2294440 A,B	01-05-1996
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		GB 2294670 A,B	08-05-1996
		NL 9220023 A	01-06-1994
		NL 9220023 T	01-06-1994
		US 5546883 A	20-08-1996
		US 5546884 A	20-08-1996
		US 5540175 A	30-07-1996
EP 297703 A	04-01-1989	JP 1706858 C	27-10-1992
		JP 3072519 B	18-11-1991
		JP 63315395 A	23-12-1988
		AU 604437 B	13-12-1990
		AU 1813488 A	22-12-1988
		CA 1306900 A	01-09-1992
		US 4836126 A	06-06-1989

CORRECTED VERSION *

PCT

WORLD INTELLECTUAL PROPERTY ORGANIZATION
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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 5 :
B63B 21/22, 21/30

A3

(11) International Publication Number: WO 93/03958

(43) International Publication Date: 4 March 1993 (04.03.93)

(21) International Application Number: PCT/NL92/00144

(22) International Filing Date: 17 August 1992 (17.08.92)

(30) Priority data:
9101396 16 August 1991 (16.08.91) NL
9200270 14 February 1992 (14.02.92) NL

(71) Applicant *(for all designated States except US)*: VRIJHOF ANKERS BEHEER B.V. [NL/NL]; Merrkoetstraat 83a, NL-2920 AC Krimpen a/d IJssel (NL).

(72) Inventor; and
(75) Inventor/Applicant *(for US only)* : VAN DER HAAK, Rob [NL/NL]; P.O. Box 105, NL-2920 AC Krimpen a/d IJssel (NL).

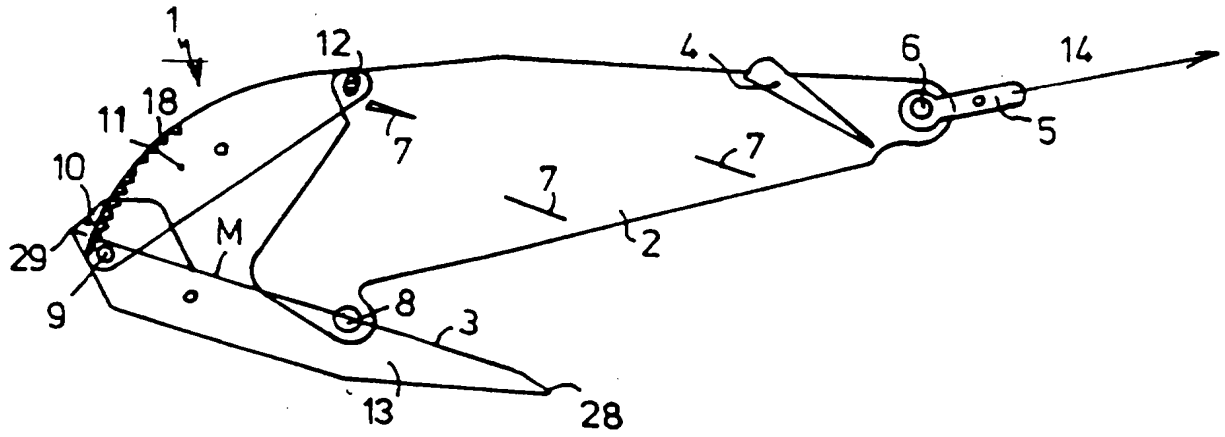
(74) Agent: FERGUSON, A.; Octrooibureau Vriesendorp & Gaade, P.O. Box 266, NL-2501 AW The Hague (NL).

(81) Designated States: AT, AU, BB, BG, BR, CA, CH, CS, DE, DK, ES, FI, GB, HU, JP, KP, KR, LK, LU, MG, MN, MW, NL, NO, PL, RO, RU, SD, SE, US, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, SN, TD, TG).

Published
With international search report.
In English translation (filed in Dutch).
Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.

(88) Date of publication of the international search report:
13 May 1993 (13.05.93)

(54) Title: ANCHOR, ANCHORFLUKE AND METHODS FOR ANCHORING



(57) Abstract

An anchor comprising a fluke means with a surface centre of gravity and a front end or penetration end and a rear end, and a shank means, being connected at a first end to the fluke means and, being provided at a second end with first means for attachment to an anchor line, said shank means being fastened by means of at least a hinged joint to the fluke means at a location either towards the front or towards the rear at a distance of the centre of gravity, and being attached by means of a disconnectable connection to the fluke means at a location on the other side of the centre of gravity with respect to the hinged joint, as well as operating means for effectuating the disconnection of the disconnectable connection by remote control. Preferably the hinged joint is located between the centre of gravity and the front end of the fluke means.

* (Referred to in PCT Gazette No. 11/1993, Section II)

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TD	Chad
TG	Togo
UA	Ukraine
US	United States of America
VN	Viet Nam

INTERNATIONAL SEARCH REPORT

International Application No PCT/NL 92/00144

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all)[6]

According to International Patent Classification (IPC) or to both National Classification and IPC

Int.Cl.5 B 63 B 21/22 B 63 B 21/30

II. FIELDS SEARCHED

Minimum Documentation Searched[7]

Classification System	Classification Symbols
Int.Cl.5	B 63 B

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched[8]

III. DOCUMENTS CONSIDERED TO BE RELEVANT[9]

Category °	Citation of Document,[11] with indication, where appropriate, of the relevant passages[12]	Relevant to Claim No.[13]
Y	US,A,4781142 (M.CHEUNG) 1 November 1988 see column 4, line 53 - column 5, line 7 see column 6, line 41 - line 45; figures 3,11	1-3,5,6
Y	NL,A,8600126 (NEDDRILL NEDERLAND BV) 17 August 1987 cited in the application see claims 1,2; figures	1-3,5,6
A	OIL & GAS JOURNAL vol. 88, no. 29, 16 July 1990, TULSA page 66 'New anchor designs'	1-7
A	NL,A,8403370 (R.VAN DEN HAAK) 2 June 1986 see claims 5,6; figures 4-6	1,2,5-7

° Special categories of cited documents : [10]

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
17-12-1992	2. 04 93
International Searching Authority	**Signature of Authorized Officer**
EUROPEAN PATENT OFFICE	STIERMAN

INTERNATIONAL SEARCH REPORT

PCT/NL92/00144

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. Claims 1-11
2. Claims 12-15
3. Claims 16-27
4. Claims 28-43

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☐ As all searchable claims could be searches without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-11

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest.

☐ No protest accompanied the payment of additional search fees.

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON INTERNATIONAL PATENT APPLICATION NO.

NL 9200144
SA 64463

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report.
The members are as contained in the European Patent Office EDP file on 23/03/93
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US-A- 4781142	01-11-88	None	
NL-A- 8600126	17-08-87	None	
NL-A- 8403370	02-06-86	None	

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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 :
B63B 21/46, 21/22 // E02D 5/80

A1

(11) International Publication Number: **WO 98/36963**

(43) International Publication Date: 27 August 1998 (27.08.98)

(21) International Application Number: PCT/NL98/00102

(22) International Filing Date: 20 February 1998 (20.02.98)

(30) Priority Data:
1005353 24 February 1997 (24.02.97) NL

(71) Applicant *(for all designated States except US)*: VRIJHOF ANKERS BEHEER B.V. [NL/NL]; Meerkoetstraat 83a, NL–2990 AC Krimpen a/d Ijssel (NL).

(72) Inventor; and
(75) Inventor/Applicant *(for US only)*: DEGENKAMP, Gijsbertus [NL/NL]; Oosteinde 21, NL–2271 EA Voorburg (NL).

(74) Agent: FERGUSON, Alexander; Octrooibureau Vriesendorp & Gaade, P.O. Box 266, NL–2501 AW The Hague (NL).

(81) Designated States: AL, AM, AT, AT (Utility model), AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, CZ (Utility model), DE, DE (Utility model), DK, DK (Utility model), EE, EE (Utility model), ES, FI, FI (Utility model), GB, GE, GH, GM, GW, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SK (Utility model), SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).

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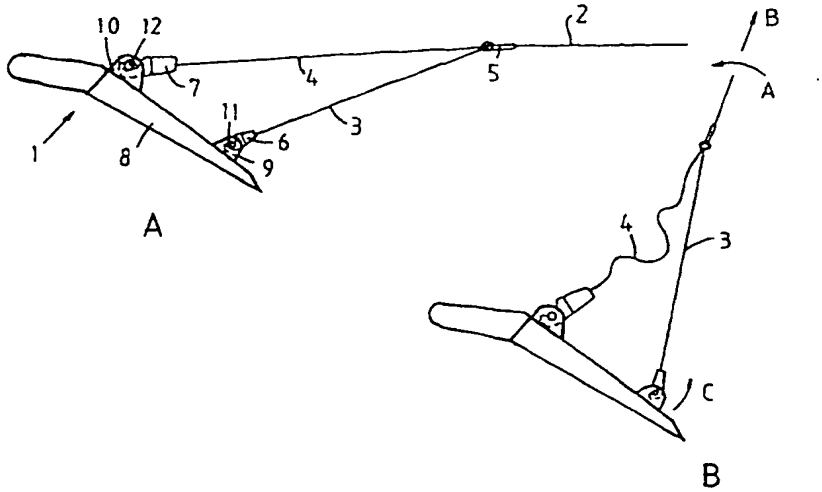
Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.
In English translation (filed in Dutch).

(54) Title: ANCHOR AND METHOD OF UNCOUPLING FOR SUCH ANCHOR



(57) Abstract

Anchor (1) with a fluke (8) with a longitudinal axis which extends from the rear end of the fluke (8) to its from end and with connection means for connecting the fluke with the lower end of an anchor line (2), which connecting means comprise an anchor shank (3, 4), the connecting means comprising at least one coupling (6, 7, 9, 10, 11, 12) with two cooperating coupling members (6, 7, 11, 12), the first of which being situated on the fluke side (11, 12) of the coupling and being directly or indirectly connected to the fluke in order to follow its movement and the second (6, 7) being situated on the anchor line side of the coupling and being directly or indirectly connected to the anchor line (2), the anchor (1) furthermore comprising operation means (17, 19) for the coupling which means are activated by swinging (A) the anchor line (2) held taut in order to change its angle with respect to the longitudinal axis of the fluke (8) and then to mutually displace the first (11, 12) and second (6, 7) coupling member from a coupling position to a position in which the second coupling member (6, 7) is released or emerges from coupling engagement with the first coupling member (11, 12), the second coupling member (6, 7) comprising a coupling hook (6, 7) which can be released by means of manipulation of the anchor line (2).

Claims

1. Anchor with a fluke with a longitudinal axis which extends from the rear end of the fluke to its front end and with connection means for connecting the fluke with the lower end of an anchor line, which connecting means comprise an anchor shank, the connecting means comprising at least one coupling with two cooperating coupling members, the first of which being situated on the fluke side of the coupling and being directly or indirectly connected to the fluke in order to follow its movement and the second being situated on the anchor line side of the coupling and being directly or indirectly connected to the anchor line, the anchor furthermore comprising operation means for the coupling which means are activated by swinging the anchor line held taut in order to change its angle with respect to the longitudinal axis of the fluke and then to mutually displace the first and second coupling member from a coupling position to a position in which the second coupling member is released or emerges from coupling engagement with the first coupling member, the second coupling member comprising a coupling hook which can be released by means of manipulation of the anchor line.

2. Anchor according to claim 1, the coupling being adapted such that after release from the coupling hook the latter can be entirely lifted away from the first coupling member by pulling the anchor line.

3. Anchor according to claim 1 or 2, the operation means being provided with means for - in the displacement mentioned - urging away the second coupling member from the first coupling member.

4. Anchor according to claim 1 or 2, the operation means being adapted for having the coupling hook pivot from the coupling position to release position, the first coupling member preferably comprising a pin about which the coupling hook engages, the operation means being adapted for having the hook pivot about an axis, which is parallel to and at a distance from the pin.

5. Anchor according to claim 4, the operation means comprising a first stopping face which at least as long as the coupling hook and the pin are coupled to one another is stationary with respect to the pin as well as a second stopping face on the hook integrated therewith, the first stopping plane forming a limitation for the displacement of the second stopping plane at pivoting the hook about the pin and therewith forming a fulcrum for the hook.

6. Anchor according to claim 5, the second stopping plane being at the most 180 degrees in circumferential direction of the hook spaced from the end of the coupling hook.

7. Anchor according to claim 5 or 6, the pin being provided with a flattening at the side of the pin facing away from the hook opening.

8. Anchor according to any one of the preceding claims, the connection means comprising a second permanent, latently present connection, between the parts of the anchor connected by both coupling members, which connection extends parallel to the coupling formed by the coupling members, and becomes active after releasing the coupling.

9. Anchor according to claim 8, the connection mentioned being a cable or chain.

10. Anchor according to claim 8, the connection mentioned

being a rigid element which can be extended or folded out.

11. Anchor according to claim 4 and 10, the coupling hook being pivotably though permanently attached to the end of an elongated, rigid intermediate member by means of a second pin, which member at the other end by means of a third pin is pivotably connected to a part of the anchor which forms a rigid whole with the pin, which is situated between the second and the third pivot pin in the coupling position.

12. Anchor according to claim 11, the intermediate member comprising a longitudinal slot which is concentrically situated with respect to the pin and in which the second pin is able to slide therein until abutment, the abutment with the second pin subsequently forming a fulcrum for the coupling hook.

13. Anchor according to claim 11, the second pin being fixedly connected to the intermediate member and the hook pivoting about the second pin at uncoupling.

14. Anchor according to any one of the preceding claims, the first coupling member being attached to the fluke and the second coupling member being attached to the lower end of the shank.

15. Anchor according to claim 14, the shank being connected to the fluke with at least two hinge connections spaced in the direction of the longitudinal axis, at least the front hinge connection being constructed as the aforementioned coupling.

16. Anchor according to claim 15, the other, rear positioned hinge connection also being constructed as the aforementioned coupling.

17. Anchor according to claim 16, the second coupling member of the front hinge connection being a part of the operation means for the rear hinge connection.

18. Anchor according to claim 14, the operation means comprising a lever mechanism which is pivotably mounted on the anchor and being in contact with a portion of the second coupling member which confines the first coupling member in order to displace it with respect to first coupling member for its releasing.

19. Anchor according to claim 18, the shank being connected to the fluke with at least two spaced hinge connections spaced in the direction of the longitudinal axis, at least the rear hinge connection being constructed as the aforementioned coupling.

20. Anchor according to claim 19, the lever mechanism extending from the rear hinge connection along the shank to the upper end thereof and being connected there for co-rotation with a shackle for an installation line.

21. Anchor according any one of the preceding claims 1-13, the coupling being situated between the shank and the anchor line.

22. Anchor according to claim 21, the shank being built of elongated elements which extend between the fluke and the anchor line, at least two elongated elements being pivotably attached with their lower ends to the fluke at positions spaced in longitudinal direction and being pivotably attached with their upper ends to a first rigid elongated coupling plate on spaced positions, a second rigid elongated coupling plate being hingably connected at one end to the first coupling plate and at a distance thereof forming the coupling with the first coupling plate.

23. Anchor according to claim 22, the hinge connection between the two coupling plates coinciding with the connection between the rear elongated element and the first coupling plate.

24. Anchor according to claim 21, 22 or 23, the shank being provided at the top with a connection for an installation line and of a connection for a mooring or load line, the connection for the installation line being provided with the coupling and the operation means for the coupling being activated by pivoting the load line.

25. Anchor according to claim 24, the operation means comprising a lever mechanism, pivotably arranged on the shank and the first coupling member having a portion, such as a wedge, confining the second coupling member being in contact with the lever mechanism in order to be displaced thereby with respect to the second coupling member for its releasing.

26. Anchor according to claim 21, the shank being rigid and the coupling being provided at the upper end of the shank, the anchor line further being connected with the shank on a location between the fluke and the upper end of the shank by means of a latently present extension.

27. Anchor according to claim 26, said location being almost perpendicularly located above the surface centre of gravity of the fluke.

28. Anchor according to claim 26 or 27, the latently present extension being connected to the shank on the said location by means of a second coupling.

29. Anchor according to claim 28, either the anchor line or the extension being connected to the upper end of the shank by means of a second latently present extension.

30. Anchor according to any one of the preceding claims, the coupling and the operation means being adapted for uncoupling in a non-destructive manner.

31. Anchor according to any one of the preceding claims, the pivoting of the anchor line for the uncoupling taking place by enlarging the forwardly opening angle between the anchor line and the longitudinal axis of the fluke.

32. Anchor according to any one of the preceding claims, a resistance such as a spring being included in the coupling in order to prevent unintended release when an uncontrolled swinging of the anchor line occurs.

33. Anchor in which one or more of the characterizing features described in the description and/or shown in the figures have been realized.

34. Method for uncoupling a coupling or lock in the connection between the fluke of an anchor and an anchor line, the anchor line being swung around in tightened state and thereby inducing the uncoupling.

35. Method as described in essence in the description and/or shown in the figures.

(AF/NG 1440)

PATENT COOPERATION TREATY

PCT

09/367761

REC'D 29 APR 1999

WIPO PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
155867		
International application No.	International filing date (day/month/year)	Priority date (day/month/year)
PCT/NL 98/ 00102	20/02/1998	24/02/1997
International Patent Classification (IPC) or national classification and IPC		
B63B21/46		
Applicant		
VRIJHOF ANKERS BEHEER B.V. et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

☒ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consists of a total of 6 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☒ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
21/09/1998	27.04.99
Name and mailing address of the IPEA/	Authorized officer
European Patent Office D-80298 Munich Tel. (+49-89) 2399-0, Tx: 523656 epmu d Fax: (+49-89) 2399-4465	A. M. BRUMER Telephone No.

Form PCT/IPEA/409 (cover sheet) (July 1998) (11/11/1998)

INTERNATIONAL PRELIMINARY EXAMINATION REPORT	International application No. PCT/NL98/00102

I. Basis of the report

1. This report has been drawn up on the basis of *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.)*

☐ the international application as originally filed

☒	the description, pages	1-16	, as originally filed	
	pages		, filed with the demand	
	pages		, filed with the letter of	
☒	the claims, Nos.		, as originally filed	
	Nos.		, as amended under Article 19	
	Nos.		, filed with the demand	
	Nos.	1-32	, filed with the letter of	16.03.99
☒	the drawings, sheets / fig.	1/5-5/5	, as originally filed	
	sheets / fig.		, filed with the demand	
	sheets / fig.		, filed with the letter of	

2. The amendments have resulted in the cancellation of:

☐ the description, pages:

☒ the claims, Nos. 33-35

☐ the drawings, sheets / fig.

3. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2 (c)).

4. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty	Claims		⇐	YES
	Claims	1-2, 32		NO
Inventive Step	Claims			YES
	Claims	3-31		NO
Industrial Applicability	Claims			YES
	Claims			NO

2. Citations and Explanations

1. D1 discloses:

an anchor with a fluke with a longitudinal axis which extends from the rear end of the fluke to its front end and with connection means for connecting the fluke with the lower end of an anchor line, which connecting means comprise an anchor shank, the connecting means comprising at least one coupling with two cooperating coupling members, the first of which being situated on the fluke side of the coupling and being directly or indirectly connected to the fluke in order to follow its movement and the second being situated on the anchor line side of the coupling and being directly or indirectly connected to the anchor line, the anchor furthermore comprising operation means for the coupling which means are activated by swinging the anchor line held taut in order to change its angle with respect to the longitudinal axis of the fluke and then to mutually displace the first and second coupling member from a coupling position to a position in which the second coupling member is released or emerges

from coupling engagement with the first coupling member, the second coupling member comprising a coupling hook which can be released by means of manipulation of the anchor line, the first coupling member comprising a pin about which the coupling hook rotatingly engages, the operation means being adapted for having the hook pivot about an axis, which is parallel to and at a distance from the pin, from the coupling position to a release position; (Claim 1)

the coupling being adapted such that after release from the coupling hook the latter can be entirely lifted away from the pin by pulling the anchor line; (Claim 2)

D1 further discloses a method for uncoupling a coupling or lock in the connection between the fluke of an anchor and an anchor line, the anchor line being swung around in tightened state and thereby inducing the uncoupling. (Claim 32)

2. The appended claims contain features known per se in the art, most of them from the pertinent prior art cited in the Search Report. (See also Point VIII)

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

1. Most of the apparatus claims, including independent Claim 1, represent an attempt to define the invention by way of functional features and/or result, without indicating any physical features allowing to obtain said functions or results.

2. The independent claims being in the one-part form, it is not clear what is the contribution of the invention over the prior art, as the one mentioned in the description does not seem to be the nearest prior art (see also the Search Report and the pertinent prior art cited therein).

INTERNATIONAL SEARCH REPORT

Int. ional Application No
PCT/NL 98/00102

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 B63B21/46 B63B21/22 //E02D5/80

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 B63B E02D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category '	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	PATENT ABSTRACTS OF JAPAN vol. 15, no. 485 (M-1188), 9 December 1991 & JP 03 208791 A (K. HIKITANI), 11 September 1991, see abstract; figures 1-7	1,4,30, 31,33-35
A		14,15, 18,19

X	PATENT ABSTRACTS OF JAPAN vol. 9, no. 206 (M-406), 23 August 1985 & JP 60 067289 A (SOUJIROU NAKAMURA), 17 April 1985, see abstract; figures 1-5	33-35
A		1-4,8,9, 14,21, 26,30,31

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[X] Further documents are listed in the continuation of box C

[X] Patent family members are listed in annex.

' Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
16 June 1998	24/06/1998

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Häusler, F.U.

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Int. ..ional Application No
PCT/NL 98/00102

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 3 450 088 A (W. GUIER) 17 June 1969 see figures 1-4	33-35
A		1,2,4, 14,15,30

X	FR 2 644 748 A (J. DUCLOUX) 28 September 1990 see the whole document	34
A		1,18,20, 25,30-32

X	US 2 007 667 A (G.E. STUBBS) 9 July 1935 see figures 1-4 see page 1, right-hand column, line 38 - line 54	33-35
A		1,30,31

X	US 4 230 062 A (P.J. FORNASIERO) 28 October 1980 see the whole document	33-35
A		1,18,20, 25,30,31

A	WO 93 03958 A (VRIJHOF ANKERS BEHEER B.V.) 4 March 1993 cited in the application see figures 1-3,10,11 see figures 19-23D see page 17, line 18 - page 19, line 12 see page 21, line 33 - page 22, line 25	1,8,9, 14,19, 22,26, 27,30,34

A	EP 0 297 703 A (S. KOBAYASHI) 4 January 1989	

1

INTERNATIONAL SEARCH REPORT

Information on patent family members

Int[illegible]ional Application No
PCT/NL 98/00102

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